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SCIENTIFIC INFORMATION REPORT

Electronics and Engineering

(24)

Summary No. 4136

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Prepared by

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SCIENTIFIC INFORMATION REPORT

Electronics and Engineering (24)

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations from recent publications of the Sino-Soviet Bloc countries. It is issued in six series. Of these, four, Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy and Physics and Mathematics, are issued monthly. The fifth series, Chinese Science, is issued twice monthly, and the sixth series, Organization and Administration of Soviet Science, is issued every 6 weeks. Individual items are unclassified unless otherwise indicated.

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ELECTRONICS

Acoustics and Audio Frequencies

1. Noise Generator of Infrasonic and Sonic Range

"Normal Noise Generators of Infrasonic and Sonic Ranges," by G. A. Andreyev and L. K. Knyazeva, Scientific-Research Radiophysics Institute at the State Hydrological Institute; Moscow, Pribory i Tekhnika Eksperimenta, No 5, Sep Oct 62, pp 121-124

The instantaneous values of voltage at the output of a normal noise generator are expressed by the Gaussian or normal law of probability distribution.

The article describes a noise generator which forms voltage according to normal law of distribution of instantaneous values in a range from 0.01 to 50 cps at one of its outputs and in a range from 20 cps to 10 kc at the other output. A single range from 0 to 10 kc can be attained by increasing the number of electronic tubes incorporated in such a noise generator. A thyratron acts as a source of noise for this generator. The power to the generator is supplied from a 220-v, 50-cps power line, and the average power consumption is about 150 va. The over-all dimensions of the device are 500 X 300 X 320 mm, and its weight is 12 kg.

Annotated Index Selections

Anntirovannyy Ukazatel' Literatury po Radioelektronike (Annotated Index of Literature on Radio Electronics), No 19 and 20, 1962

Following are translations of selected abstracts from the above source. Numbers in brackets indicate the issue from which each abstract was selected.

1. "[Problemy kibernetiki?] (Problems of Cybernetics); Moscow, Fizmatgiz Publishing House, No 7, 1962. [19]

"E. I. Nechiporuk, Boolean Functions With Argument Inversions, pp 115-126

"The author investigates the properties of functions of logic algebra which permit a considerably simpler representation than the class of all functions. This class of functions is characterized by an invariance relative to certain argument inversions. The problem of the synthesis of a circuit according to the characteristic of the examined class is also solved.

"Yu. V. Glebskiy, Coding With the Aid of Automatic Machines Having a Finite Internal Memory,' pp 127-149

"The article examines the question of one-to-one coding of words in a particular alphabet by words in another (or the same) alphabet with the aid of operators which are modifications of ordinary operators in discrete automatic machines. The modification of ordinary operators makes it possible to describe the coding of letters with words of different length. The work does not consider questions relating to the statistical nature of sources of information.

"O. S. Kulagina, 'On the Use of Machines for Compiling Algorithms of Text Analysis,' pp 209-233

"The problem of establishing an algorithm for the analysis of a text with the aid of a machine is described. Two types of analysis algorithms are examined in detail, and results of an experimental analysis of one of these algorithms are given. The author examines a different type of error in algorithms, where in it is proven that the number of incorrectly analyzed words does not exceed one tenth of the total number of words in a text.

"'Symposium in Kiev on Principles of the Construction of Self-Learning Systems; pp 231 [sic] 235

"This article gives a brief annotated list of reports read at the sumposium, which was organized by the Computer Center of the Academy of Sciences Ukrainian SSR and the Ukrainian Republic Board of the Scientific-Technical Society of Radio Engineering and Electronics imeni A. S. Popov. Of interest are the reports of V. M. Glushkov, V. K. Chichinadze, A. G. Ivakhnenko, and others. Two sessions of the symposium were devoted to a discussion on the subject "Principles of the Construction of Learning, Self-Learning, and Self-Teaching Systems."

2. "Voprosy magnitnykh izmereniy (Problems of Magnetic Measurements); Kiev, Publishing House of the Academy of Sciences Ukrainian SSR, 1961. [19]

"O. A. Gerashchenko and others, 'On the Choice of an Automatic Control Circuit for a Differential Calorimeter,' pp 27-37, illustrated

"A brief examination is made of some of the possible automatic control circuits for a differential calorimeter used to measure losses in ferromagnetic materials at high frequencies. The systems may be designed for controling temperature or for controlling the rate of change of temperature in the calorimeter vessels. Systems for control of temperature which do not have errors in the method used provide greater measuring accuracy. A comparison of continuous and discontinuous-pulse systems are simpler in construction.

3. "Novyye razrabotki v oblasti kontrol'no-izmerit. apparatury (New Developments in the Field of Control-Measuring Apparatus); Moscow, Svyaz'-izdat Publishing House, 1962, [19]

"L. V. Nadenenko, 'Portable Measuring Points for the Study of Ultrashort-Wave Propagation,' pp 4-15, illustrated

"A description is given of the make-up and arrangement of equipment and instruments for portable measuring points in three vehicles which were outfitted by the Scientific-Research Institute of the Ministry of Communications USSR for the purpose of studying ultrashort-wave propagation. A block diagram of the portable measuring point is given, and the instrument used to measure the field intensity of centimeter waves, basedon a straight amplification circuit, is described in detail. A block diagram and brief description are also given of a highly sensitive instrument for measuring the field intensity of centimeter waves, which is comprised of a superheterodyne receiver and d-c amplifier with a recording milliammeter at the output. The threshold sensitivity of the receiver with an input resistance of 75 ohms is on the order of 5 microvolts.

"A. A. Shur, 'Instrument With Increased Sensitivity for Measuring Field Intensity at Superhigh Frequencies,' pp 16-21, illustrated

"The author describes an instrument representing a narrow-band superheterodyne receiver which is used to measure field intensity at superhigh frequencies; tuning to the frequency of the transmitter is accomplished by periodically changing the frequency of the heterodyne. When the difference between the frequencies of the heterodyne and the signal becomes equal to the intermediate frequency of the receiver, there appears at the output of the if amplifier a pulse whose amplitude is proportional to the level of the received signal. The discrete voltage is detected by a peak detector and recorded by an indicator. A block diagram and external view of the measuring instrument are given. The instrument operates in a frequency range of 2,000-1,765 Mc, the limits of automatic frequency adjustment of the heterodyne are ± 1.5 Mc, and the sensitivity is not less than $8.5 \cdot 10^{-15}$ watts. The instrument may be used to observe fading with a frequency of no more than 25 cycles.

"A. M. Prokhorov, 'Instruments IVZ-2 and IVZ-1 for Measuring the Characteristics of Group Delay Time' pp 22-28, illustrated

"A description is given of the designation and operation of the individual components of instruments consisting of an adjustable frequency oscillator, receiver, selective amplifier, frequency indicator, sweep generator, oscillograph, and power supply. Complete technical data are given for the instruments which have a measuring accuracy of ± 1 musec in a 10-Mc band and ± 2 musec in a 20-Mc band, while the range of measured values is from 0 to 100 musec. Operating frequency for the first instrument is 1,600 to 2,000 Mc, and for the second instrument, 3,400 to 4,000 Mc. The method of using the instruments is described.

"V. Ya. Korol', 'Intermediate Frequency Sweep Generator,' pp 29-40, illustrated

"General information is provided on IF sweep generators, and a generator with two 3-centimeter klystrons is described. Schematic and block diagrams of the generator are given, and the principles of operatio of individual units of the sweep generator are examined. The generator is designed for tunign wide-band equipment and measuring the discrepancies of delay time of wide-band amplifiers and for various other measurement purposes.

"A. I. Zudakin and others, 'Instrument for Measuring Noise Power in Multichannel Radio Relay Lines With 240, 600, and 900 Channels, pp 41-53, illustrated

"The basic function of this instrument is to measure the intensity of total noise and fluctuating noise during the assembly, adjustment, and checking of radio relay lines when real multichannel information is absent (measurements with communications shut down). By the simple subtraction of fluctuating noise from total noise power, the intensity of nonlinear noises may be determined from the results of these measurements. The instrument may be also be used for measurements under operational conditions, that is, during the transmission of multichannel information, as well as in multichanel telephone systems using a coaxial cable.

"A. M. Prokhorov, 'Instrument IVZ-T for Measuring the Characteristics of Group Delay Time in the Video Frequency Range,' pp 54-68, illustrated

"The IVZ-T instrument is designed for measuring the characteristics of group delay time in two-terminal pair television equipment in the video frequency range. The characteristic is observed on the screen of a cathode ray tube. The instrument may also be used for measurements over rather short lines (up to 500 km) using a return channel (two-wire circuit). The technical data of the IVZ-T are: frequency range from 0.1 to 10 Mc; measured values from 0.05 to 5 microseconds; measurement error -- 2% $\pm$0.01 microsecond; sweep frequency band from 0.3 to 10 Mc; maximum signal discrepancy at input of the instrument in the sweep frequency range -- $\pm$ db; and output level of sweep generator of the instrument, from 0.03 to one v.

"A. M. Prokhorov and A. Yu. Zykov, 'Instrument IF-T for Measuring Phase Angles in the Video Frequency Band,' pp 69-77, illustrated

"The IF-T phasemeter is intended to measure phase angles between sinusoidal voltages in the video frequency band with a sufficiently high degree of accuracy. The instrument has the following technical characteristics: operating frequency band from 100 kc to 20 Mc; difference of input levels is +40 db with a minimum voltage at the input of 10mv; measured angles are from 0 to 360°; measurement accuracy is ±1°; input resistance of the instrument heads is 0.5 Megohms; input capacitance is 12 pf; and maximum level at the input and output of the measured object is 1.5 v.

"B. K. Solntsev, 'Frequency Standard With Wide Frequency Spectrum,' pp 78-86, illustrated

"A description is given of a frequency standard for generating frequencies of 10 Mc, 500, 100, 10 and one kc, and 50 c which has a frequency stability in the limits of $\pm 2.10^{-8}$. A block diagram is given of the instrument which includes the following: two quartz oscillators at 5 and 100 Mc, a heat-regulating device, nine frequency divisions (up to one c), a 100-Mc frequency doubler, harmonics generators for 100 Mc and 100 and 10 kc, an oscillograph for frequency comparisons and a clock. The instrument uses a quartz resonator which decreases the effect of mechanical vibrations on the frequency.

"L. K. Zegebart, 'PICh-3 Frequency-Measuring Device,' pp 87-98, illustrated

"The author describes the PICh-3 all-wave frequency-measuring device which has a range from 15 kc to 200 Mc. The device is designed for use at frequency control points of the Ministry of Communications USSR. Basic technical characteristics of the PICh-3 are: frequency range from 15 kc to 220 Mc; measurement accuracy of $10^{-7} \pm 0.5$ c; and time required for one measurement 1-2 minutes. The device operates from the SCh-3 frequency standard which has a stability on the order of 1.10^{-7}.

4. "Uskoriteli (Accelerators), No 3, Collection of Articles; Moscow, Gosatomizdat Publishing House, 1962 [20]

"S. P. Lomnev, 'Some Problems of the Dynamics of Particles in a Nonuniform Focusing Magnetic Field,' pp 68-74, illustrated

"The effect of the angle of misalignment of coils on transverse oscillations of particles is ivestigated. An evaluation of the field required for focusing and the maximum permissable misalignment of the coil are made for a particle with $N = 3.15$. It is concluded that for reliable focusing the misalignment must be less than half a degree. The author considers the influence of a constant H_r component on transverse oscillations. Examples are given which explain the defocusing action of this component, which is particularly noticeable in the end part of the accelerator.

"S. P. Lomnev, 'Wave-guide Bucher of a Linear Electron Accelerator,' pp 98-114, illustrated.

"The author investigates the effect of the nature of change of the phase velocity of a wave and the amplitude of the accelerating field strength on the characteristics of the output parameters of the beam. The investigation is based on integration of the equation of phase oscillations. For an explanation of the method of solution relative to $_{B}(z)$ and $E_{o}(z)$, the author makes a detailed examination of the case where the buncher is supplied by a magnetron, creating an accelerating field with a maximum instensity Eomax on the order of 30 kv/cm. The problem is examined for different values of Eomax and $_{B}(z)$.

"A. V. Shal'nov, 'Diagram for the Engineering Calculation of a Diaphragm-Type Wave Guide for a Linear Electron Accelerator,' pp 136-140, illustrated

"A diagram for the calculation of a diaphragm-type wave guide for a linear electron accelerator is described; the diagram makes it possible to determine the basic characteristics of the electron beam at the output of the accelerator and to estimate the stability of these characteristics with respect to time. A general view of the diagram is given, and the sequence for performing the operations is pointed out. It is noted that the described diagram was used in practice for the manufacture of series-produced accelerators having energy ratings of 3 and 5 Mev. A satisfactory correlation is obtained between the theoretical and experimental characteristics of the accelerated beam.

"S. P. Lomnev, 'Use of the Walkinshaw Method To Compute the Gemoetry, Fields, and Attenuation in the Wave Guide of a Linear Electron Accelerator,' pp 141-147, illustrated

"The results of a numerical investigation of a system of homogeneous equations for determining the expansion factors of Maxwell equations are examined. The parameters of the investigated cells of a diaphragm-type waveguide are given in table form. The cells were selected in a such a manner as to explain the influence of the value of phase velocity of a wave on the accuracy of computing the geometry, the percent of power applied to the fundamental harmonic, and its attenuation.

"A. G. Tragov, 'Investigation of the High-Frequency Properties of Diaphragm-Type Wave Guides on the Basis of a Representation of Fields in the Form of Normal Waves,' pp 148-160, illustrated

"A dispersion equation is derived, and it is shown that the specific selection of the distribution function of an electrical field provides a sufficiently high accuracy in computing the phase velocity of a wave. Two equations are derived for the characteristic conductivity of a diaphragm-type wave guide which make it possible to describe the properties of the wave guide on the basis of network theory. These equations are approximations in the general case; however, by increasing the distance between the diaphragms, the theories of two-terminal pair filters assume strict relationships.

"O. A. Val'dner and others, 'Parametrization of Group Velocity,' pp 185-191, illustrated

"The author shows the possibility of representing in parametric form the relationship of group velocity to the geometric dimensions and phase velocity of a wave for a diaphragm-type wave guide; parametric curves are given which were constructed for oscillations of the /2 type on the basis of results of experimental data. The accuracy with which values of group velocity may be determined from given curves is estimated.

"E. A. Sinitsyna and N. P. Sobenin, 'Phasemeter Circuit With a Doublt T-Junctiion as the Mixer,' pp 207-214, illustrated

"The article describes a phasemeter method of measuring phase velocity in a diaphragm-type waveguide. To increase the accuracy of phasemeter circuits, the coaxial wave-guide mixer is replaced by a double waveguide T-junction. A relationship is established between the measurement errors and the parameters which characterize the quality of tuning the couble T-junction and the change in amplitude of the signal taken from the waveguide. It is shown that a phasemeter circuit with a double T-junction as a mixer makes it possible to carry out difference measurements with less systematic error than previously proposed circuits.

5. "[Problemy kibernetiki?] (Problems of Cybernetics); Moscow, Fizmatgiz Publishing House, No 7, 1962. [20]

"O. B. Lupanov, 'On One Class of Circuits Made of Functional Elements (Formulas With a Partial Memory),' pp 61-114, illustrated

"Circuits in which the output of each element is connected to a large number of inputs of other elements are examined. Such circuits are studied from the viewpoint of the complexity of their relization of functions of logic algebra. In a number of cases, the author resorts to geometric terminology with the aid of dichotomic trees. An asymptotic equation is obtained for the known Shannon function in the case where the above-described circuits are used.

6. "Fizicheskiye osnovy rascheta poluprovodnikovykh termoelektricheskikhustroystv (Physical Principles of the Design of Semiconductor Thermoelectric Devices), by A. I. Burshteyn; Moscow, Fizmatgiz Publishing House, 1962, 133 pp, illustrated. [20]

"This book contains a systematic account of problems of the design of thermoelectric devices based on semiconductors (thermoelectric generators, heating, and refrigeration devices). Theoretical investigations of the more important circuits with semiconductor thermoelectric devices, insufficiently covered in the scientific literature, are supplemented in this book by timely examples of the concrete design of operating semiconductor equipment. The book is written for physicists, engineers, and technicians working in the field of the practical application of semiconductors.

7. "Opredeleniye parametrov sluchaynykh protsessov (Determining the Parameters of Random Processes); Kiev, Gostekhizdat Publishing House, 1962, 167, pp illustrated. [20]

"This collection contains material on problems of the measruement and calculation of different statistical characteristics (monents of first and higher orders, correlation functions, energy spectra, and probability distribution) of real random processes. Particular attention is devoted to the determination of measurement errors which appear as a result of the limitation of time for analysis of the investigated process. The conclusions and results of the articles found in this collection, as well as the methods of investigation, may be used by scientific and engineering-technical personnel interested in problems of communications theory, the theory of automatic control, and their practical applications.

8. "Priyemno-usilitel'nyye lampy povyshennoy nadezhnosti (Receiver-Amplifier Tubes With Increased Reliability), by I. G. Bergel'son and others; Moscow, Sovetskoye Radio Publishing House, 1962, 648pp, illustrated. [20]

"The technical and operating characteristics of reliable receiver-amplifier tubes used in industry are contained in this reference book. The design, production, and quality control features of reliable tubes are briefly described. Recommendations are made on the proper utilization of these tubes in equipment. In addition to the basic static characteristics of the tubes, the reference manual contains highfrequency, pulse, and other special characteristics, as well as the relationship of tube parameters to operating conditions. Data which characterize the operating properties of the tubes, such as life time, stability, resistance to shock and vibration, heat and cold resistance, etc., are also given. The reference manual is written for a broad category of engineering and technical workers concerned with the development, exploitation, and repair of radio equipment and for students of radio engineering departments of higher educational institutions.

9. "Sistemotekhnika. Vvedeniye v proyektirovaniye bol'shikh sistem (Systems Engineering. Introduction to the Design of Large Systems), by G. Kh. Gid and R. E. Makol; Moscow, Sovetskoye Radio Publishing House, 1962, 383 pp, illustrated. [20]

"The general methodology of the design of complex engineering systems is discussed in this book. The authors examine complexity as a particular phenomenon and discuss some general methods of overcoming the difficulties involved in designing complex systems. The book is of an applied nature; the material is presented in easily understandable form. Knowledge of higher mathematics is not required since the required mathematical devices are included in the discussion. The book should be of interest to engineers of various specializations and economic planning and scientific workers concerned with complex engineering problems.

10. "Nekotoryye voprosy prikladnoy akustiki (Some Problems of Applied Acoustics); Moscow, Voyenizdat Publishing House, 1962, 368 pp, illustrated. [20]

"This book examines a broad category of problems relating to the theory and application of ultrasound and hydroacoustics. Ultrasonic converter circuits are described, and examples are given of their application in military affairs, science, and engineering. The characteristics of sound-absorbing materials are given. Aircraft and ship noises are analyzed, and methods of decreasing these noises are pointed out. The book is written for those interested in problems of contemporary acoustics and hydroacoustics.

11. "Radiolokatsiya i yey primeneniye (Radar and Its Application), by G. F. Sluchevskiy; Moscow, Voyenizdat Publishing House, 1962, 259 pp, illustrated. [20]

"In this book, the physical principles of radar are discussed, and the interaction between the basic components of a pulse radar station is examined. The author considers methods of determining target coordinates, gives the concepts of automatic tracking, and provides the tactical-technical characteristics of radar stations. The military application of ground radar and the general characteristics of present air- and ship-borne radar equipment and recognition systems are given. The author examines problems of counter-radar measures against an enemy, as well as methods of combating interference against radar stations. The book may be useful to a large number of readers who desire to become familiar with the physical principles of radar, radar equipment, and the military application of radar.

12. "Radiotelemetriya (Radio Telemetry), by F. I. Barsukov and M. V. Maksimov; Moscow, Voyenizdat Publishing House, 1962, 184 pp, illustrated. [20]

"This book examines the design principles and elements of radio telemetry systems with frequency, time, code, and combined separation of channels. Particular attention is devoted to problems of the design of coders and decoders of radio telemetry systems, as well as the features of receiving-transmitting and antenna equipment. The book is intended for persons familiar with principles of radio engineering and may be of use as a study aid for engineering and technical staff in radio engineering specializations of different branches of the army. Material from the open Soviet and foreign literature was used in writing the book.

13. "Osnovy radioizmeritel'noy tekhniki (Fundamentals of Radio Measuring Technique), by I. M. Sorkin; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 278 pp, illustrated. [20]

"General theoretical information on methods, measuring instruments, and systems of units of measurements are presented in this book. The author gives a classification of methods of measurement and analysis of errors, illustrated by a number of calculations and numerical examples. The book considers methods of measuring current and voltage, frequency, modulation and wave form, field intensity, and the parameters of radio transmitting and receiving equipment. The basis concepts of radio measurements in the superhigh-frequency range are given. A great deal of attention is devoted to an account of the principles of operation at the following radio-measuring instruments and apparatus: thermoelectric instruments, electronic voltmeters, digital instruments, frequency meters, frequency standards, spectrum analyzers, instruments for measuring coefficient of nonlinear distortion and field intensity, a-m and f-m standard signal generators, and other measuring equipment. The book is written for engineers and technicians working with radio-measuring apparatus, as well as for students of technical schools.

14. "Avtomaticheskaya podstroyka chastoty (Automatic Frequency Control), by M. R. Kaplanov and V. A. Levin; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 320 pp, illustrated. [20]

"The authors discuss the basic problems related to the theory, design, and application of automatic frequency control systems. The formulas which are provided may be used in the design of apparatus with automatic frequency control. On the basis of an analysis of circuits for the automatic control of frequencies of self-oscillators, systems for automatic tuning of frequency-dependent networks, particularly resonance amplifier circuits, are examined. Solution of the avove problems is of great importance in automating the control of radio equipment. This book is written for radio specialists and students in senior courses of higher technical schools.

15. "Kompleksnaya Avtomatizatsiya telefonnoy svyazi energosistem (Complex Automation of Telephone Communications of Power Systems), by N. V. Andreyev and G. S. Karasin; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 88 pp, illustrated. [20]

"In this book, the authors examine a wide class of problems relating to the complex automation of local and long-distance telephone communications in power engineering systems. General problems of the automation of telephone communications are considered, and information is given on equipment and its practical application. The book is intended for engineers, technicians, and foremen working in the field of the design, installation, and operation of communications facilities in power engineering systems.

16. "Proizvodstvo podogrevateley katodov elektrovakuumnykh priborov (Production of Cathode Heaters for Electric Vacuum Devices), by Yu. L. Semenov; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 135 pp, illustrated. [20]

"The technological principles of producing heaters for electric vacuum devices are examined. The author describes the general properties and specifications of materials used in the production of heaters, methods of manufacturing bases andmethods of coating heaters with an insulating layer, and special tests for heaters. The physical processes which occur in vacuum tube heaters are briefly discussed. The book is written for design engineers and technologists in the electric vacuum industry and may also be of use as a study aid for the students of the appropriate educational institutions.

17. "Priyemnyye televizionnyye trubki (Television Receiving Tubes), by Yu. V. Kostylkov; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 71 pp, illustrated. [20]

"This book presents in popular style the basic concepts of electron optics and the physical processes which occur in television receiving tubes. The technical parameters and characteristics of Soviet-manufactured tubes are also given. The book is written for radio amateurs with average technical training; however, it may also be used as a reference manual by engineers and technical workers wherever the use of television receiving television receiving tubes is required.

18. "Iskusstvennyye i sinteticheskiye volokna i plenki dlya elektricheskoy izolyatsii (Artificial and Synthetic Fibers and Films for Electrical Insulation), by V. A. Privezentsev and A. O. Magidson; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962k 112 pp, illustrated. [20]

"This book presentthe classification, forming methods, and characteristics of artificial and synthetic fibers and films. The following are examined: artificial fibers -- viscose, copper-ammonia, acetate and triacete-, acetoubutyrate-, and tripropionate cellulose, etc.; synthetic fibers -- (a) heterochain: polyamides, polyurethanes, polyesters (capron, perlon, silon, nylon, enant, lavsan, etc.); and (b) carbon chain: chlorin, vinyon, saran, nitron (orlon), polyestyrene, polyethylene, polytetraflouroethylene, polypropylene, etc. In addition, general information is provided on the production of electrical insulating films, and the natural characteristics of all basic types of electrical insulating films produced here and abroad are given. The book is intended for engineers and technicians working in the field of electrical insulation.

19. "Sinteticheskaya slyuda (Synthetic Mica), by M. S. Leyzerzon; Moscow/Leningrad, Gosenergoizdat Pblishing House, 1962, 192 pp, illustrated. [20]

"This book is devoted to the problem of the production of synthetic mica, the study of its properties, and the possibilities of its technical utilization. It briefly summarizes both the broad experience obtained in work on this problem and results of investigations conducted in the USSR under the guidance of the author. In light of the present status of the theory of crystal formation, the author examines means for solving the technical problem of producing synthetic mica which greatly surpasses natural mica in its properties and technical characteristics, as well as in importance to the national economy. Some possible methods for the further development of work on the synthesis of mica and prospects for the use of synthetic mica and new materials based on it in different branches of engineering are also examined. The book if written for scientific and engineering-technical workers in the field of radio electronics, aviation and defense technology, andelectrical engineering.

20. "Odnopolosnaya modulyatsiya (Single-sideband Modulation), by M. V. Verzunov, I. V. Lobanov, and A. M. Semenov; Moscow, Svyaz'izdat Publishing House, 1962, 300 pp, illustrated. [20]

"This book examines the properties of single-sideband modulated oscillations and methods of producing a single-sideband signal; general information is provided and single-sideband receivers. Methods of increasing the efficiency of single-sideband transmitters are discussed. The authors compare single-sideband modulation with other types of control of oscillations and describe elements of the circuitry of single-sideband equipment. Questions of the application of single-sideband modulation in multichannel radio communication lines are discussed. The book is intended for a broad category of scientific workers and engineers concerned with the theory and application of single-sideband modulation.

21. "Radioobmen (Radio Traffic), by B. Ye. Kitayevich; Leningrad, Morskoy Transport Publishing House, 1962, 221 pp, illustrated. [20]

"This is a textbook for radio engineering specialists and may serve as a reference manual containing information relating to the practical training of radio operators for the maritime fleet. Special chapters are devoted to rules of radio communication, documentation of ship radio stations international handbooks, receiving transmissions in the English language which concern naviagation safety, and problems of teaching reception and recording with a typewriter using the "blind" method. The book contains methodically developed excercises and illustrations for all sections of practical study, making it possible for the book to be used independently by students of correspondence classes.

22. "Radioreleynaya svyaz' na zheleznodorozhnom transporte (Radio Relay Communications in Railroad Transportation), by A. A. Ustinskiy and V. G. Bodilovskiy; Transzheldorizdat Publishing House, 1962. [20]

"This book presents the principles of the design and multiplexing of radio relay lines; high frequency and auxiliary equipment and types RRS-1, R-60/120, and RM-24A radio relay apparatus are described, and problems of the design, electrical supply, and operation of radio relay communication lines are examined. The book has been approved by the Main Administration of Educational Institutions of the Ministry of Railroads as a textbook for railroad transportation technical schools and may be used relay communication lines.

23. "Programmnoye upravleniye koordinatno-sverlil'nymi stankami (Program Control of Jig-Boring Machines); Kiev, Mashgiz Publishing House, 1962, 88 pp, illustrated. [20]

"The positioning systems of models SP-2 and RSP-1 program-controlled jig-boring machines are described. The book examines the construction of the individual components of the program control systems for these machines and describes methods of their adjustment and testing. Methods of designing inductive converters and electromagnetic pulse counters are given. A review is made of existing program control systems of modern jig-type machines manufactured here and abroad. The book is written for engineers working in the field of automation of metal-cutting machines.

24. "Kratkiy spravochnik gal'vanotekhnika (Concise Handbook on Electroplating), by A. M. Yampol'skiy and V. A. Il'in; Moscow/Leningrad, Mashgiz Publishing House, 1962, 244 pp, illustrated. [20]

"This handbook examines general problems of electroplating and provides information on materials used for protective coating purposes. Particular attention is devoted to preparation for coating, technological coating methods, and electrodeposition of protective coatings. Technological problems of special lacquer-varnish coatings are examined, and information is given on labor protection and safety engineering. The handbook is intended for qualified workers and foremen in electroplating shops and may also be useful to students of technical schools who are specializing in the field of electroplating.

Circuit Theory

3. Two-Circuit Amplifiers With Negative Resistance

"On the Theory of a Two-Circuit Amplifier Based on Two-Terminal Networks With Negative Resistance," by Yu. L. Simonov; Moscow, Radiotekhnika, Vol 17, No 11, Nov 62, pp 44-49

The author analyzes a two-circuit high frequency amplifier based on two-terminal networks with negative resistance. Computed relationships are derived for determining the amplification parameters of a two-circuit amplifier. It is concluded that the described circuits provide a somewhat greater gain than resonance amplifiers using two-terminal networks with negative resistance. However, the latter type of amplifier has an advantage in its lower natural noise level. The author notes that the relationships provide in this work may be used in engineering calculations of two-circuit amplifiers based on two-terminal networks with negative resistance.

4. Noise Intensity of Circuits With Negative Resistances

"Noise Intensity of a Circuit With Negative Resistances," by I. M. Aynbinder; Moscow, Radiotekhnika, Vol 17, No 11, Nov 62, pp 30-43

"A generalized method is presented for the analysis and calculation of the noise intensity of linear networks containing both positive and negative resistances. Certain elements of the method are illustrated in an example of the analysis of a class of combined parametric (or tunnel) circuit and tube amplifiers without feedback. The results of this analysis are reduced to engineering calculations. An example of the calculations. An example of the calculation of combined decimeter-wave parametric and tube amplifiers is given."

5. Shift Register Circuit With Two-Aperture Transfluxors and No Diodes

"Estimating the Practical Possibility of a Diodeless Shift Register Circuit Based on Two-Aperture Transfluxors," by S. P. Mironov; Moscow, Elektrosvyaz', No 10, Oct 62, pp 38-44

Simplified expressions are obtained which characterize the operation of a diodeless shift register circuit based on two-aperture transfluxors for a finite number of clock pulses. An engineering estimate is given of the feasibility of the circuit with respect to fast-action, and requirements are given with respect to clock current values and mean output of the power sources.

6. Asymmetrical Loads in Four-Wire Networks

"Computing Four-Wire Low-Voltage Networks for a Mixed Asymmetrical Load," by A. Kh. Paronyan; Yerevan, Sbornik Nauchnykh Trudov Yerevanskiy Politekhnicheskiy Institut (Collected Scientific Works.

Yerevan Poltechnic Institute), 1960, pp 335-345 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 19, 15 Oct 62, 19 Ye 204)

A new method is considered for computing asymmetrical four-wire low-frequency networks where the asymmetry of the load in each phase causes different losses of voltage and power, which considerably complicates the calculations for a network with neutral conductor. In the suggested method, the computation is made without accounting

for the inductance when the conductivities of the neutral and the phase conductors are equal and with the assumption that the power factors of the individual receivers are identical. To simplify the calculations, nomograms are given for the dependence of the computed secondary coefficients on the power factor of the receivers. The improved simplicity of the suggested method is demonstrated by a comparison with a grapho-analytical method.

Communications

7. Narrow-Band Channel Television with Variable Parameters

"Certain Properties of Digital Television System With Variable Line and Frame Frequencies," by V. P. Mandrazhi and D. A. Novik; Moscow, Radiotekhnika, No 10, Oct 62, pp 35-44

The article discusses the design feasibility of a universal television system which automatically changes all of its parameters in accordance with the peculiarities of the tramsmitted image. A universal television system is understood to be a system where the transmission of moving images is dependent on peculiarities of the image and the characteristics of human vision. Most effective television transmission can be achieved such a universal system where the time period for each frame, the number of lines per frame, and the brightness gradation vary automatically in accordance with the nature of the transmitted image.

The design and characteristics of digital television systems which approach a universal system in effectiveness are discussed. The problem of synchronization in such systems and the performance of storage transmission tubes used in such systems are analyzed.

The band-width of the channel for a digital television system is much narrower than that needed for conventional television broadcasting.

8. Influence of Fading Signal of Interfering Radio Station in Telegraph Reception

"On the Noise Stability of One Method of Duplex Reception in Phase Telegraphy," by B. D. Osipov; Moscow, Elektrosvyaz', No 10, Oct 62, pp 21-24

A study is made of the influence of the fading signal produced by an outside radio station on the stability of the radio communication of individual phase telegraph channels during diversity reception.

9. Standardization Study of Colar TV With Quadrature Modulation

"The Basic Problems of the Standardization of the Radio Broadcasting System of Color Television With Quadrature Modulation," by S. V. Novakovskiy; Moscow, Elektrosvyaz' No 10, Oct 62, pp 9-20

This work considers only the fundamentals involved in the standardization of the radio broadcasting system of color television with quadrature modulation for I- and Q-coding axes. System parameter values are established for a high-quality image and good compatibility with black-and white in accordance with the requirements established by GOST 7845-55 and OIRT standard.

No comparisons are made between this system employing quadrature modulation of the subcarrier and other known systems because sufficient experimental studies of the various systems have not been conducted.

10. Objective Control of TV Image at the Studio

"Measuring Transfer Characteristic by Video Signal Analysis," by E. A. Shul'ts; Moscow, Elektrosvyaz', No 10, Oct 62, pp 30-37

On the basis that video quality control at television centers by visual observation involves purelysubjective control, this work discusses one possible objective control method which involves the measurement of the transfer characteristic on the basis of the statistical properties of the transferred image. Results are given of an experimental study of some of these properties.

V. A. Yefimov and V. F. Ivanov assisted the author in setting up the experimental apparatus.

11. Visual Perception Values Rather than Objective Brightness Values in TV Gamma Correction

"On Contrast Sensitivity and Halftone Reproduction in Systems Which Transmit Images," by Ye. L. Orlovskiy, Yu. I. Mednikov, P. N. Kulakov, and L. N Shchelovanov; Moscow, Elektrosvyaz', No 10, Oct 62, pp 45-55

On the assumption that halftone (gamma) correction in television produces neither the result expected on the basis of theory nor a result comparable to that achieved in telephoto reproduction and since the usual ten-gradation wedge gives only a qualitative picture of halftone reproduction, this work suggests that gamma correction be computed, not on the basis of an objective brightness value, but

on the basis of visual perception of brightness and gives an indirect method of measuring visual brightness perception based on the Weber-Fechner law.

12. Traffic-Handling in the Case of Correlated and Uncorrelated Noise

"The Traffic-Handling Capacity of Two Classes of Information Channels With Randomly Changing Parameters," by N. Z. Zheleznov; Moscow, Elektrosvyaz', No 10, Oct 62, pp 3-8

Two classes of channels are considered in which the effect of a statistical change of parameters may be considered as either the manifestation of additive noise correlatted with the signals (first class channel) or not correlated with the signals (second class channel). Theorems are demonstrated which give an estimate downward for the traffic-handling capacity of such channels; example calculations are given for concrete cases.

Components

13. Method of Forming Precision Resistors for Printed Circuits

"Prospective and Rational Design of Printed-Circut Registors for Microminiature Equipment," by Yu. P. Yermolayev, Kazan' Aviation Institute; Kiev, Izvestiya Vysshikh Uchebnykh Zavedeniy, Radiotekhnika, No 4, Jul/Aug 62, pp 469-475

Microminiaturization of electronic components is at present one of the most important problems in the design of electronic modules. Among the many factors limiting the miniaturization of electric components is the heat dissipation by elements such as resistors.

Resistors used in micro-modules generally consist of a resistive film applied in the form of a rectangular area to the insulating backing of a printed circuit. Although efforts are being made to distribute the resistors uniformly over backing so as to ensure effective heat dissipation, overheating is often observed in certain sections of the resistor. Such undesirable overheating occurs especially in the case of very thin backing having poor conductivity. Thus, imporper distribution of heat-generating elements over the backing often results in local overheating and destruction of the resistor.

This article presents an analysis of existing and prospective printed-circuit resistors from the standpoint of prevention of local overheating amd makes suggestions for decreasing such overheating. A series of design fourmulas are presented which were checked experimentally with the aid of an electronic along and by direct measurement of the temperature gradient.

14. Transistorized Amplifiers

"Standardized Semiconductor Amplifiers for Automatic Potentiometers and Bridges," by N. S. Nikolenko; Moscow, Priborostroyeniye, No 10, Oct 62, pp 9-11

The recently designed transistorized amplifiers UPD-14 and UPD-24 are suitable for replacing tube amplifiers in existing automatic measuring instruments with low ohmic output, such as EPP, EMP, EDP, EMD, EPV, MPR, MCRM, and DPR. The UPD-24 is intended for use with acridges; the UPD-14 incorportates a vibro-converter. The over-all dimensions of the UPD-24 are 65X85X106 mm; and of the UPD-14, 65X85X135 mm. In the lower part of the unit are located transformers; and in the middle, the rectifier, filter, and output stage. The rectifier and preamplifier are mounted on printed circuits.

The initial group of 50 UPD amplifiers was subjected to very thorough laboratory and operating tests. A comparison of conventional tube amplifiers with the new semiconductor amplifiers has shown that the latter possess higher reliability, greater ruggedness, and lower power consumption and are lighter and smaller.

15. Thin Film Components

"Lithuanian 'Midget'"; Minsk, Sovetskaya Belorussiya, 11 Oct 62, p 4

The Physics Institute, Academy of Sciences Lithuanian SSR, has succeeded in reducing the weight and current consumption of semiconductor components without altering their dynamic parameters. One of the institute's laboratories prepared and tested various radio engineering components using microfilms instead of semiconductor crystals. The thickness of such films may be as low as one thousandth of a human hair. These new film components will function as resistors, diodes, triodes, and capacitors.

Information Theory

16. Method of Compensating for Parasitic Modulation

"Parasitic Modulation Caused by a Small Additive Noise," by E. L. Blokh and A. A. Kharkevich; Moscow, Radiotekhnika, Vol 17, No 11, Nov 62, pp 5-13

General relationships are derived for the signal-to-noise ratio of a carrier of arbitrary form acted upon by a small additive noise. A geometric interpretation of the problem is given. A carrier in the form of a sequence of trapezoidal pulses is used as an example. The authors consider the possibility of compensating for the parasitic modulation resulting from the action of the additive noise by using the changes of the unmodulated parameters of the carrier. That is, since a correlation exists between the parasitic increases of the parameters of the carrier, it is possible to use the parasitic increases of the unmodulated parameters (those not used in the given form of modulation) to eliminate or decrease the parasitic increases of the modulated parameters.

Infrared

17. Measuring Reflection Factors in Infrared Band

"Determining the Spectral Diffuse Reflective Property of Infrared Radiation," by B. P. Kozyrev and O. Ye. Vershinin, Izvestiya Leningradskogo Elektrotekhnicheskogo Instituta (News of the Leningrad Electrical Engineering Institute), No. 45, 1961, pp 147-158 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 12, 30 Jun 62, 12 V 21)

The measurement of the coefficient of reflection in the infrared portion of the spectrum, so important in various fields of science and engineering, is particularly important in calculations of radiant heat exchnage and in the designing of radiation thermocouples and bolometers. Up until now, however, very few materials have been studied, and the data given by various authors are quite divergent.

For this reason, an analysis was made of known methods of measuring the diffuse reflection of infrared radiation and possible losses of radiant energy.

A detailed description is given of a measuring apparatus, as well as the coefficient of reflection of such well-studied materials as magnesium oxide and aluminum glass. In repeated tests on one and the same specimen, the measured values of the coefficient of reflection did not exceed plus-minus 1.0 percent. A comparison of the results of the measurements with data obtained by other authors shows good agreement and indicates the possibility of using this method to study all types of targets, regardless of the nature of their reflection.

Instruments and Equipment

18. Device for Producing High-Intensity Magnetic Field

"How, Where, What"; Moscow, Komsomol'skaya Pravda, 21 Jul 62, p 4

A short note reads as follows:

"Huge installations are generally needed for production of production of powerful magnetic fields. A group of Moscow scientists has utilized for this purpose the phenomenon of superconductivity, which is based on the fact that at temperatures close to absolute zero many metals

and alloys lose their electric resistivity. The scientists have succeeded in building a miniature solenoid with a superconductive alloy (niobium with zirconium) and obtained a magnetic field of 35,000-oersted intensity.

"This superconductive solenoid possesses marvelous properties -- it does not require electricity to sustain the magnetic field."

19. Lectures on Electrical Engineering in Tallin

"Lectures on Electrical Engineering," by E. Ioosep, State Committee, Council of Ministers Estonian SSR for Coordination of Scientific-Research Work; Tallinn, Sovetskaya Estoniya, 20 Sep 62, p 4

First of a series of four scheduled lectures sponsored by the management of the exhibit "Electrical Engineering in East Germany" took place at the Scientific-Research Electrical Engineering Institute at Tallinn. The subject of the lecture was: "Design and Technology of Electronic Measuring Instruments." The second lecture, which will be devoted to the problem of application of pulse and measuring techniques, will be delivered on 20 September; the third will be on the subject of television-testing instruments; on 21 September; and the fourth will be on the subject of counter instruments manufactured by the Radio Plant at Erfurt.

20. Compensating Accelerometer

"Filtering Compensating Accelerometer," by K. N. Sergeyev and A. Ye. Sinel'nikov, Leningrad Institute of Precious Mechanics and Optics; Leningrad, Izvestiya Vysshikh Uchebnykh Zavedeniy, Priborostoyeniye, Vol 5, No 5, 1962, pp 98-106

This article describes an accelerometer capable of measuring acceleration with small dynamic distortions in a range of given frequencies and of filtering out at the output the vibrational amplitude of the instrument base. In this device, the counter-balancing force is generated electrically. The instrument incorporates two sensing elements having freedom of motion about two shafts of the instrument. The first sensing element consists of a form with feedback coil and the potentiometer sliding contacts. On the form of the second sensing element is also mounted a transducer of driving movement. All of the coils rotate in a constant magnetic field. A weight, rigidly attached to the first form, creates unbalance in

the first sensing element. The second sensing element is balanced with respect to its shaft, so that linear acceleration does not affect it. The action of acceleration on the weight causes the first sensing element to turn on its shaft in scuh a manner as to create a singal on the potentiometer proportional to the angle of rotation. Current in the second feedback coil will be proportional to the magnitude of acceleration.

The dynamic error of the accelerometer does not exceed 1.5%. With the aid of such a filtering compensating accelerometer, it is possible to widen considerably the range of vibrational frequencies, as compared to conventional single weight accelerometers.

21. Inspection With a Tape Recorder

"Tape Recorder Searches for Defects"; Yerevan, Kommunist, 10 Aug 62, p 4

A special tape recorder designed by the senior engineer of the Problem Laboratory of the Moscow Electrical Engineering Institute for Communications, Georgiy Pankov, under the guidance of Prof Isaak Goron, is able to detect defective sports on roller-bearing races. The recording is done on the friction surface of the race ring. Such a recording on the race surface is then reproduced with the aid of the pick-up head on a oscilloscope screen. The defective sports appear on the screen in the form of irregular pips.

22. Method of Reducing Friction in Instrument Bearings

"Investigation of a Method of Reducing Friction in Bearings," by I. M. Sivokonenko and K. N. Yavlenskiy, Leningrad Institute for Aviation Instrument Building; Leningrad, Izvestiya Vysshilh Uchebnykh Zavedeniy, Priborostroyeniye, Vol 5, No 5, 1962, pp 134-139

High-precision instruments generally require a very low friction in the bearings. Such a reduction of friction in sliding and rolling bearings can be attained by applying either rotary (in the opposite direction) or oscillatory motion to the two bearings of the instrument shaft. To attain effective reduction in bearing friction, the angular velocity of the bearings in opposite directions with respect to each other should be greater than the angular velocity of the instrument shaft. In such case, the moments of the force of friction are in opposite directions; thus the shaft is subjected to the action of the difference of the two moments, not to the sum of the two moments as in the case of stationary bearings. In case of oscillatory motion of the bearings, the angle of oscillation should be greater than 360°.

In this experiment, the bearings were rotated in opposite directions at various speeds from 9.7 to 26 radians per sec. The weight of the shaft was 240 g.

The experiment has shown that the starting friction of sliding bearings can be reduced almost 20 times, and of rolling bearings, almost 10 times by applying the described method.

23. Research at the Metrology Institute

"Precision Metering Service," by M. Vasin; Leningrad, Leningradskaya Pravda, 5 Oct 62, p 4

Ye. D. Koltik of the All-Union Scientific-Research Metrology Institute imeni Mendeleyev has developed a very sensitive instrument which measures phrase-difference with an accuracy of one tenth of a degree. The Institute is now working on a still more precise phrase-difference meter.

The device UPMA-2 developed by A. M. Teplinskiy measures millionth fractions of a volt or ampere and is used for ore prospecting from the air.

The Institute developed a high-precision interferometer utilizing the orange line of krypton gas which is kept at a temperature of 210°C below zero. This interferometer is used to standarize secondary standards of length. After 1 January 1963, all of the measures of length in the USSR will have to conform to this new primary standard of length. The Soviet suggestion for switching to the light standard of length was warmly received by scientists from all parts of the world.

24. Millisecond Time Meter

"Millisecond Matrix Time Meter," by G. I. Mishin, Physico-technical Institute, Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 5, Sep/Oct 62, pp 106-112

A time-measuring device is described which permits registration of 14 successive time intervals of not less than 64 microsec each or not greater than 16,448 microsec. The accurach of measurement is about ±0.02 microsec and is independent of period duration. The maximum time for individual instrument operation is 230,272 microsec.

The instrument is built on the principle of counting the number of oscillations of a 1-Mc oscillator occuring during the measured time interval. Information from a single counter is fed sequentially to

appropriate columns of a matrix which consists of storage elements incorporating MTKh-90 cold-cathode thyratrons. The device has a dead time of about 64 microsec which is needed for transmitting information and for resetting the meter. Such dead time is constant for all time intervals and is added to the meter reading. High accurach of the meter is ensured by a 23L051 cathode-ray tube with spiral scan. The prototype meter had a counter capacity of 214 and a 14-channel matrix.

25. SDD Light-Rangefinder Tested

"Testing an Experimental Model of the SDD Light-Rangefinder," by Yu. B. Virovets, A. I. Demushkin, and M. T. Prilepin, Moscow, Geodeziya i Kartografiya, No 10, Oct 62, pp 8-14

Testing of the SDD light-rangefinder (a typeof geodimeter) was carried out in 1961 on the grounds of the Central Scientific-Research Institute of Geodesy, Aerial Surveying and Cartography (TsNIIGAiK), near Moscow. The purpose was to determine the instrument's accuracy of measurement and operating range. The method of thesting and data resulting therefrom are presented. The following conclusions are made by the authors, based on a comparison of tabular data presented in the article and the requirements set forth in "Instructions on Construction of the State Geodetic Network of the USSR (1961)" on the length of lines and accuracy of measurement. For distance and accuracy, the SDD light-rangefinder can be used for measuring sides in 2d, 3d, and 4th order traverses. In those cases when the length of a side exceeds 15 km, especially favorable conditions of visibility must be present or an argon-zirconium lamp (with which it is proposed to equip and experimental series of instruments) must be used. In some cases, it is expedient to measure lines by sections

26. Pulse-Height Analyzer With Permanent Memory

"Pulse-Height Analyzer With Periodic Static Memory," by R. G. Ofengenden and O. M. Rozental', Physics Institute, Academy of Sciences Ukrainian SSR; Moscow, Pribory i Tekhnika Eksperimenta, No 5, Sep/Oct 62, pp 113-117

A multichannel pulse-height analyzer with periodic memory is described in which information recorded is retained after disconnecting the power supply, as contrasted with a conventional analyzer where the stored information generally vanishes at the instant the power is switched off. A magnetic drum is used here to store the information. Two tracks on the magnetic drum are used for recording synchronizing pulses. From track 1 the triggering pulses are reproduced, and from track 2, the high-frequency pulses. The high-frequency pulses are then divided into 16 channels

on the basis of frequency. The pulses reproduced from track 1, the high-frequency pulses, and the channel pulses are employed to control the performance of the analyzer. The analyzed pulses are formed, fed through a rectifier, and stretched. Across the capacitance, a voltage proportional to the height of the analyzed pulse is formed. This voltage is fed to one of the inputs of a comparator circuit. To the second input of the comparator is fed the step-by-step linear voltage formed by the channel pulses.

It is possible, by utilizing the described method for pulse-height analysis, to design an analyzer for simultaneoul measurement of n spectra with a rather minor increase in additional equipment as compared to a single spectrum analyzer.

27. Recent Soviet Patents in the Field of Electronics and Instrument Design

"Class 21. Electrical Engineering and Class 42. Measuring Instruments and Apparatus"; Moscow, Byulleten' Izobreteniy, No 16, Aug 62, pp 27-39, pp 48-59

Class $21a^1$, 11_{01}. No 149445; by N. F. Knyazeva and K. Ye Volkovitskiy. Receiving Device for Electronic Telegraph Equipment.

Class $21a^1$, 32_{11}. No 149447; by V. A. Vatsenko, M. V. Gitlits, and Ye. K. V. Rozenkrants. Device for Transverse Line Recording and Reproduction.

Class $21a^1$, 32_{35}, No 148448,; by I. K. Malakhov, Ye. N. Arkadyeva, V. M. Lyubin, L. G. Paritskiy, and S. M. Ryvkin. Storage Method for Visible and Infrared Images.

Class $21a^1$, 35_{21}. No 149452; by Yu. S. Glazer. Relaxation Oxcillator With Three Steady Positions.

Class $21a^4$, 71. No 149475; by Ya. L. Shamfarov. Method of Measuring Phase Velocity of Electromagnetic Wave Propagation in Retarding Systems.

Class 21g, 13_{11}. No 149509; by M. Ye. Zhabotinskiy and V. V. Grigor'yants. Molecular Oscillator.

Class 42d, 10. No 149582; by V. A. Breskin. Pulsed Root Extractor.

Class 42m, 14. No 149618; by G. G. Men'shikov. Device for Reading Information From Capacitive Storage Unit.

Class 42m, 14. No 149625; by G. F. Yanbykh. Method of Converting Binary Code Into Ring Code.

Materials

28. Influence of Deformations on Coercivity of Ferromagnetic Alloys

"The Influence of Deformation on the Coercivity of Ferromagnetic Alloys," by I. Ya. Dekhtyar and D. K. Levina, Sbornik Nauchnykh Rabot Instituta Metallofiziki AN USSR (Collected Scientific Works of the Institute of Metallophysics, Academy of Sciences Ukrainian SSR), No 13, 1961, pp 51-61 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 19, 15 Oct 62, 9 B 7)

A study was made of the influence of plastic deformation ϵ on the H_c of the following: technical nickel, disordered alloys Fe -25% Al; Fe + 8% Al; Fe + 8% Cr; and the ordered alloys Ni_3Mn; Ni_3Fe; 20% Co, 60% Ni, 20% Mn; 40% Co, 40% Ni, 20% Mn; and 60% Co, 20% Ni, 20% Mn.

It was found that, for the nickel and the first three alloys, $H_c \sim \epsilon 1/4$, which confirms the relationship $H_c \sim N_d^{1/2}$ (where N_d is the desity of the parallel lines of the dislocations). Thus the increase of H_c with increased ϵ is caused by a braking effect of domain boundaries at the ever increasing number of dislocations.

This dependence is also derived for ordered alloys and qualitatively confirmed in accordance with theory.

29. Change of Resistance in Copper-Manganese Alloys During Deformation

"Change of Electrical Resistance in Copper-Manganese Alloys During Plastic Deformation," by I. Ya. Dekhtyar and V. S. Mikhalenkov, Sbornik Nauchnykh Rabot Instituta Metallofiziki AN USSR (Collected Scientific Works of the Institute of Metallophysics, Academy of Sciences Ukrainian SSR), No 13, 1961, pp 62-69 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 18, 1962, 18 B 20)

The added specific resistance $\Delta\rho$, caused by plastic deformations, is expressed by the formula $\Delta\rho, = A_{\epsilon\ 1/2} + B\epsilon\ 3/2$, where the first addend characterizes the embedding in Δ of dislocations and the second addend characterizes the embedding in Δ of vacancies (A and B are coefficients determined by the material, and ϵ is the degree of deformation.) Data obtained from a series of experiments show a difference in the contribution of the vacancies and of the dislocations in $\Delta\rho$ for various metals and alloys. This work investigates copper alloys with

0.54, 1.0, 1.35, and 2.07 at % manganese and electrolytically pure copper. The ductile, drawn 0.5-mm wires (10 cm in length) were annealed 3 hours in vacuum at 900 deg centigrade for the purpose of stress relief. The greatest degree of deformation was caused by twisting, whereby all specimens showed an almost linear dependence of Δ on the number of turns (twists).

In the case of the Cu-Mn alloys, the greatest increase of resistance with temperature during deformation was obtained with a manganese content of 1.35 at %.

From the degree of nonuniformity of distribution of the deformation cross section, the dependence of $\Delta\rho$ on the length of specimen, radius of specimen, and number of twists was derived. The coefficients A and B for the investigated alloys were computed on the basis of the determined dependence and experimental data.

30. Ni-Zn Ferrite Powders For Recording Heads and Cores

"Finely Dispersed Nickel-Zinc Ferrites," by A. S. Eysurovich, Trudy Vsesoyuznogo Nauchno-issledovatel'nogo Instituta Zvukozapisi (Proceedings of the All-Union Scientific-Research Institute of Sound Recording), No 9, 1961, pp 138-145 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 18, 1962, 18 B 14)

A technology was worked out for preparing a finely dispersed Ni-Zn ferrite with additions of Cu. The dense structure of this ferrite preparation afforded the possibility of improving the quality of the working surface of the slot of magnetic recording heads. Another technology was perfected for preparing various types of cores from industrial Ni-Zn ferrite powder with a composition similar to the F_2-400 type with stabilized magnetic properties.

31. Ion Conductivities in Ceramics

"Investigation of the Nature of Conductivity of Ceramic Materials," by M. V. Vaysman, Uchenyye Zapisi Stalingradskogo Pedagogicheskogo Instituta (Scientific Reports of the Stalingrad Pedagogic Institute), No 11, 1959, pp 85-91 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 18, 1962, 18 B 43)

After passing through a 0.25-screen, kiln clay, with a moisture content of 15-20 percent, was formed under a pressure of 185 kilograms (force) per square centimeter. The specimens, after being dried to final weight at 120 degrees centigrade, were fired in a

muffle furnace at 900 degrees centigrade. They were then polished, washed in carbon tetrachloride and distilled water, dried at 120 degrees centigrade, and placed in a drier. The electrical conductivity was studied in the temperature range 350-550 degrees centigrade. The electrolysis was done at field potentials of 6-7 kilovolts per centimeter. After current had been passed through the specimens, they were washed in distilled water, and the Na and K-contents were determined by titration with a 0.1 normal solution of H_2SO_4. The Ca, Mg, and Al-contents were determined with reactive murexide, magneson, and stilbazole.

The total amount of Fe was determined with sulfosalicylic acid, and the Fe^{3+} with ammonium thiocyanate. The method used ("Tubandt" method) affords the possibility of determining cations Ca^{2+}, Mg^{2+}, Al^{3+}, Fe^{2+}, and Fe^{3+} within 2 or 3 micrograms. At a temperature of 350 degrees centigrade, almost all of the current is carried by Mg and Na ions; at 550 deg C, the highest Hittorf number is shown by the Mg^{2+} ions; then, in order, by Na^{+}, Al^{3+}, Fe^{3+}, and Fe^{2+}. The comparatively low Hittorf number of Al^{3+} increases almost linearly with temperature. The Fe-ions participate in electrical conductivity only at temperatures above 450 degrees centigrade. Within the limits of the measurement error, the Hittorf number of Ca^{2+} is equal to zero at temperatures below 550 degrees centigrade.

32. Change of Permittivity With Composition in Dielectrics in ZnO-TiO_2 System

"On Computing the Permittivity of Radio Ceramic Dielectrics in the System ZnO-TiO_2," by A. A. Kuznetsov, Materialy XXII Nauchnoy Konferentsii. Saratovskiy Gosudarstvennyy Pedagogicheskiy Institut. Fakultet Yestestvoznaniya, Fiziki, Matematiki, 1961 (Proceedings of the 1961 Twelfth Scientific Conference. Saratov State Pedagogical Institute. Faculty of Natural Sciences, Physics, Mathematics), 1961, pp 125-131 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 18, 1962, 18 B 45)

Sintered oxide ceramics representing a two-phase system of zinc orthotitanate $2ZnO \cdot TiO_2$ have a rutile, spinel, or zincite structure, depending on which oxide is in excess. If the composition of the mixture satisfies the simple formula $2ZnO \cdot TiO_2$, then a one-phase system is formed, consisting of Zn_2TiO_4. A number of specimens were prepared of the system ZnO-TiO_2 (ZnO content varying from 10 to 70 mol percent). The ε (permittivity value) of these specimens was computed according to formulas of Likhtenekker and Odelevskiy, based on ε

computed ϵ values were compared with values measured at a frequency of 5 megacycles per second and a temperature of 20 degrees centigrade, whereby good agreement of the theoretical and measured values was shown in the case of those specimens which contained not more than 50 mol percent ZnO. A graphic of the dependence of the measured ϵ value on composition shows a sharply defined minimum in the interval 50-70 mol percent ZnO. Specimens with 70 mol percent ZnO have a permittivity value ϵ reduced by a factor of 1.5.

33. Application of Magnetodielectric Materials in Electric Machinery

"Application of Magnetodielectric Materials in Construction of Electric Machines," by M. Z. Khamudkhanov and V. A. Troitskiy; Novocherkassk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Elektromekhanika, No 10, 1962, pp 1175-1180

At the Institute of Power Engineering and Automation, Academy of Sciences Uzbek SSR, work has been conducted since 1958 on the problem of utilizing magnetodielectric materials in electric machines. Such magnetodielectric materials with high magnetic permeability are manufactured by mixing synthetic resins with pure iron powder. Utilization of open slots with magnetic wedges in rotating electric machines will eliminate nonuniformity of air gap, lower additional losses, and simplify winding operations.

In this experiment, the magnetodielectric material, in the form of a viscous paste, was used to fill the slots in synchronous motors. The magnetic paste was made with pure iron powder reduced from mill scale and of such fineness that 66% would pass through a 270 mesh. Replacement of wooden wedges by magnetodielectric material in electric motors has improved the efficiency and power factor and also reduced heating of the winding.

Thus, the use of magnetodielectric wedges in electric motors will result in improved characteristics and simplified manufacturing procedure. Application of magnetodielectric materials in morors operating at higher frequencies, such as 400 cps, should be thoroughly investigated since magnetodielectric materials are practically free of eddy current losses.

Solid State Devices

34. Semiconductor Refrigerators

"Investigation of Semiconductor Coolers and Ice-Making Machines," by V. A. Nayer; Odessa Technological Institute for Food and Refrigeration Industry; Moscow, Kholodil'naya Tekhnika, No 5, Sep/Oct 62, pp 42-46

The Semicondustor Laboratory of the Technological Institute of the Food and Refrigeration Industry fabricated and tested several prototypes of semiconductor coolers and ice-making machines.

The water-cooling machine had a capacity of 30 kcal/hr with water outlet at 10°C. Capacity of the ice-making machine was 0.7 kg of ice per hr. The water cooler had 16 thermocouples, each consisting of p-type and n-type elements interconnected by copper plates. To each hot junction were welded copper ribs. To each cold junction was welded one aluminum rib which was immersed in cooling water. The weight of such a cooling unit without the rectifier was about 350 g, of which 45 g represented the weight of the thermocouples.

The ice-making unit consisted of 32 thermocouples, weighing about 135 g. The total weight of the unit was 1.2 kg. The dc current to the cooling unit was supplied from a single-phase full-wave rectifier. When operating at full capacity, the ice-making machine drew 120 a of dc supply and consumed about 80 kg of cooling water per hour.

The semiconductor cooling machines may find wide use in industry and households when the problem of efficient cooling of the hot junction is solved.

Miscellaneous

35. Recent Soviet Patents in the Field of Electronics

"Class 21. Electrical Engineering"; Moscow, Byulleten' Izobreteniy, No 17, Sep 62, pp 24-29

Class 21a[1], 36. No 149807; by I. F. Vasil'yev and G. U. Osipenko. A Method of Error Detection in Received Telegraph Messages.

Class 21a[1], 3606. No 149808; by Ya. Ye. Belen'kiy. Multiphase Multivibrator With Dual Positive Feedback.

Class $21a^4$, 6_{02}. No 149811; by G. V. Rykov. Method of Synchronizing Multichannel Systems of Communications by Synchronizing Signals and the Device To Perform It.

Class $21a^4$, 8_{02}. No 149812; by V. A. Bunin and R. I. Raykhlin. Method of Stabilizing High-Stability Frequency Oscillators.

Class $21a^4$, 10. No 149813; by P. L. Strelets and V. I. Moskalev. Method To Control the Process of Polarizing Ceramic Piezoelectric Materials.

Class $21a^4$, 71. No 149814; by I. S. Vayngarten, O. V. Vol'pe, R. N. Gordeyev, and B. G. Shvarts. Device for Measuring the Transit Microwave Power.

Class $21a^4$, 71. No 149815; by A. Ye. Reznikov. Method of Measuring Standing-Wave Ratio in Acoustic Fields.

Class 21b, 27_{01}. No 149817; by M. P. Zaretskiy. Method of Exploitation of Thermogenerator-Storage Battery Set.

Class 21c, 46_{50}. No 149820; by V. M. Kuntsevich. Servo System With Compounding.

Class 21c, 54_{05}. No 149821; L. S. Priver. Quality Control Method for Current-Conducting Layer and Junction for Nonwire Type Resistors.

ENGINEERING

Automatic Control Engineering, Computers

36. New Computer KIFA 101

"Electronic Prodigy"; Kiev, Pravda Ukrainy, 13 Oct 62, p 4

Engineers and technicians of the Institute of Atomic Physics, Rumanian Academy of Sciences designed and constructed a new type of computer, the KIFA 101. This general purpose machine is of the serial type with a magnetic drum memory. It is the size of an ordinary desk and operates on conventional power line current.

37. Small-Scale Electronic Digital Computer

"Computing Center ... on a Table"; Moscow, Smena, No 21, 1962, p 31

Electronic computer... In any mention of it one usually thinks of complicated equipment occupying an area of several square meters...

But look at this picture. On a writing table is a structure -- a small apparatus differing little in size from a radio receiver. It is a small-scale electronic computer. This original novelty was designed and constructed by a collective of Kiev engineers under the direction of Academician V. M. Glushkov.

Despite its small size, the lilliputian electronic digital computer successfully handles solutions of 9th degree algebraic equations and linear and nonlinear differential equations.

The new apparatus possesses an important advantage. It is so simple to operate that no special training is required.

The marvelous small-scale electronic computer has become a reliable assistant of a vast army of originators of new techniques and personnel of design bureaus and laboratories, scientific research institutes, and project organizations.

38. Language Translation by Machine

"Text Translated ... by Machine," by A. Kakosyan, Armtag Correspondent; Yerevan, Kommunist, 2 Nov 62, p 2

Experiments in machine translation of foreign languages at the computing center of the Armenian Academy of Sciences, begun four years ago, are now having practical results.

According to the chief of the division of mathematical linguistics and machine translation, V. Grigoryan, themost difficult part of the problem was setting up an algorithm for analysis of Armenian scientific and technical text. The language was carefully analyzed, and a special grammer, "understood" by the machine, was prepared on a strictly philological basis. The rules for variations of words and their use in sentences were put in the form of mathematical formulas. All of this information on the language was combined in 14 standard tables - a "syntactical dictionary."

A unique feature of this algorithm is the so-called "intermediate" language. The algorithm is programed automatically into machine language, making it possible to put any algorithm into the machine and translate from one language to another. The machine first "reads" and "remembers" the text, translates it into intermediate language, and then translates it in final form. Time for translation averages 40 seconds per sentence.

Text from the book Course in Higher Mathematics was used for the experiment. Translation was from Armenian to Russian. Comparison of the machine translation with the original text -- written in both Russian and Armenian -- indicated that the two versions "corresponded completely." Illustrating the high degree to which the system has been perfected, Grigoryan said that once the machine stopped because of a superfluous comma put in by a translator and would not resume operating until it was removed.

Grigoryan states that the machine will not rep ace man when it is a matter of a smooth translation but that it will be a great help to him.

39. High-Capacity Electronic Computers in Computing Center of Lithuanian SSR Academy of Sciences

Vil'nyus, Sovetskaya Litva, 15 Sep 62, p 4

For the information of institutes the Academy of Sciences Lithuanian SSR announces that in 1963 the computing center of the Academy will conduct its calculations with the aid of high-capacity electronic computers.

"Institutes wishing to enlist the services of the computing center are advised to make arrangements as soon as possible with the Institute of Physics and Mathematics of the Lithuanian SSR Academy of Sciences (30 - Kostyushki Ul., Vil'nyus).

40. Machine Which Searches for Patents

"Machine Searches for Patents," by Ye. Muslin; Moscow, Vechernyaya Moskva, 28 Sep 62, p 2

The All-Union Scientific Research Institute for State Patent Certification (VNIIGPE) exists to process the roughly 300,000 patents coming yearly into the All-Union Technical Patent Library from all over the world and also to check the 10 to 12 thousand new inventions yearly in the USSR against the 7 million patents in the library before a new patent can be issued to the inventor. To aid in this work there was recently established in the VNIIGPE a Laboratory for Mechanization of Certification, in which were installed computers using punched cards said to be capable of scanning 600 patents per minute.

41. Use of Digital Computers To Select Most Economical Structural Parameters

"Problems in the Application of Electronic Digital Computers for Selecting the Most Economical Structrual Parameters," by I. B. Motskus, A. V. Alishauskas, and F. P. Yushka; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 5, Sep Oct 62, pp 948-950

The article indicates some ideas in computer mathematics and well-known physical connections between basic structural parameters of use in machine methods for an optimal design of electric meters. The BESM-2 computer at the computing center of the USSR Academy of Sciences was used for the purpose.

The basic structural parameters of the instruments are expressed by the relation $X = (x_p)_m$, where m is the number of independent parameters.

42. Solution of Differential Equations on Fixed-Point Digital Computers

"A Practical Method for Automatic Selection of Scales in the Solution of Systems of Ordinary Differential Equations," by I. F. Goncharova and A. V. Martynov; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 5, Sep Oct 62, pp 921-924

Using methods of Euler, Runge-Kutta, and Adams, the author derives formulas for the numerical solution on a fixed-point digital computer of a system of rodinary differential equations of the type

$$\frac{dy_i}{dt} = a_{i1}(t)y_1 + a_{i2}(t)y_2 + \ldots + a_{in}(t)y_n \quad , \; i = 1, 2, \ldots, n$$

defined in the interval [a,b], with initial conditions $y_1 = y_{10}, \ldots, y_n = y_{n0}$ for $t = t_0$.

Submitted 15 August 1961.

43. Stabilization of Solutions of Optimal Problems

"Stabilization of Solutions of Optimal Problems," by M. A. Krasnosel'skiy and A. Yu. Levin; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 5, Sep Oct 62, pp 915-921

Given a series of single-type problems $Z_1, Z_2, \ldots$, such that in problem Z_n ($n = 1, 2, \ldots$) it is required to find n numbers $c_1^{(n)}, c_2^{(n)}, \ldots, c_n^{(n)}$ satisfying certain conditions, ath author defines this set of circumstances as the vector solution of the problem Z_n. Given, further, that the quantities $c_i^{(n)}$ do not depend on the number of

the problem n: i.e. $c_i^{(n)} = c_i^{(i+1)} = c_i^{(i+2)} = \ldots$ $(i = 1, 2, \ldots)$, he then defines the sequence $\{c_i^{(i)}\}$ as a stabilized equence. In other words, c_1, c_2, c_3, ... form a stabilized sequence if for each natural n the numbers c_1, c_2, ..., c_n are vector solutions of the problem Z_n.

Having established these difinitions, the author then proceeds to prove three theorems on stabilized vector solutions, including the necessary and sufficient conditions for the stabilized vector solution of a given problem.

44. Use of Computer for Recognizing Distorted Text

"Results of an Algorithm for the Recognition of Machine-Produced Characters," by V. K. Yeliseyev and V. A. Kovalevskiy; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 5, Sep Oct 62, pp 902-911

The paper contains the results of a method for the recognition of standard characters with a very high degree of reliability which has been programed for a modified "Kiev" computer. The basis of the method is the assumption that all forms of a particular character -- for example, a typewritten character -- appear as idealized, standarized characters subjected to distrotion, and the character can be distinguished from a standardized distortion by uniform darkness and variation of contrast. The distortion is superimposed on the character; i.e., certain points, independent of the rest, may be lighter or darker than the corresponding points of the standard. It is assumed that all these distortions can be described by simple statistical laws.

A description of the method of recognition may be summarized as follows:

The coefficients of correlation of the unknown character are calculated from each of the standards for all possible distortions in the defined region. The unknown character is identified with that standard which corresponds to the largest coefficient of correlation. For simplification, the scalar porduct of the nonnormalized vector representing the unknown character and the normalized vector of the standard character, proportional to the coefficient of correlation, is calculated in place of the latter.

Out of 35,000 numbers tested, 2 wrong answers and 3 rejections were obtained. Three general conclusions may be drawn from the results: (1) very high reliability of recognition is obtained for large distortions of printed characters;

(2) the probability of a malfunction during reading of the first sample of text is on the order of less than 10^{-4};

(3) the reliability in reading machine-produced text is significantly higher than in other described methods of recognition. The probability of error is on the order of 10^{-4}.

45. Pulse-Code Telemetering Device

"Transmitting Pulse-Code Telemetering Device," by A. A. Abdullayev, M. S. Granovskiy, I. A. Nabiyev, and A. M. Feyder; Moscow, Priborostroyeniye, No 10, Oct 62, pp 14-15

In this pulse-code telemetering device a mixed "decimalcombination" code is used where the decimal column relationship exists between the decimal digits, while each decimal column is broken up into five elements each. Such an arrangement permits distortion-free reception. The coding device is built in the form of a mechanical decimal counter having a shaft rotated by a motor. The starting torque at the coder shaft is equal to 30 g·cm. For each digital column the device has two parallel fixed disks between which the counter wheel rotates. Each disk has five ferrite semirings with windings placed radially and uniformly along the disk circumference. The counter wheel of each digital column is in the form of a brass disk with two radial slots placed in such position that at any time three of the five semrrings are screened. The counter wheel thus acts as a coding element, the position of which corresponds to information fed to the input of the proper digital column. The pulse forming unit contains five tone-frequency oscillators operating in a range of 1,200 to 2,100 cps. The output voltage of each tone-frequency oscillator is 3-4 v. The oscillators are controlled by transistors. In the described model the transmission duration for a five-digit code is about 2 sec and the duty factor is 2. The signal reception in this telemetering device is carried out by a unit with five frequency selectors which feed the deciphered signal to the printer.

The laboratory results of this pulse-code telemetering prototype are very promising.

46. Determining Optimum Rolling Rate in an Automated Reversing Mill

"On Determining the Efficient Rate of Ejection of the Villet From the Rolls on an Automated Reversing Mill," by L. P. Smol'nikov; Izvestiya Leningradskogo Elektrotekhnicheskogo Instituta (News of the Leningrad Electrical Engineering Institute), No 46, 1961, pp 118-127 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 18, 1962, 18 K 27)

One factor which determines maximum productivity for an automated reversing mill is the equality of the times for operating the squeeze-down mechanism (t_{ny}), for the return of the ejected billet to the rolls for the next pass (t_o), and for reversing the electric drive of the mill during the pause between passes.

Relationships are established between the t_{ny} value and the value of the reduction of the subsequent pass, and between the t_o value and the value for the rate of billet ejection. The latter relationship, which represents a linear correlation, was investigated experimentally on a 1,150-mm blooming mill and a 900-mm billet mill in a rail-rolling shop. The relationship between t_o and the rate of ejection (rolling) was the same for all passes. The correlation function, obtained with the aid of the Fisher function, fell within the limits 0.8-0.93. An equation was derived with which it is possible to compute the optimum rate of ejection (rolling) for each pass, depending on the value of the reduction. There is a 0.64-0.84 probability of a deviation of t_o within the limits plus-minus 0.15 second. This necessitates a direct control of the position of the work with respect to the rolls in automated rolling.

47. Automation of Oil Well Production

"192 Gushers and Deep-Pump Oil Wells"; Baku, Bakinskiy Rabochiy, 15 Sep 62, p 3

A short caption reads as follows:

"192 gushers and deep-pump oil wells will be serviced simultaneously by a new telemetering device built at the Baku plant of Telemetering Equipment and Automation Instruments imeni Kalinin.

"With the aid of this device the oil field personnel will be able to measure pressure in wells, to control the operation of deep-well pumps, to receive signals of malfunctioning and to maintain a two-way telephone conversation with oil wells located in a radius of 10 km.

"The device was designed by the collective of the Azerbaydzhan Scientific-Research and Design Institute 'Neftekhimavtomat'".

48. Double-Feed Rotating Transformers for Mathematical Operations

"Device for Multiplication and Division of Voltages with the Aid of Double-Feed Rotating Transformers," by M. I. Chernenko and L. P. Shiniberov, Leningrad Electrical Engineering Institute; Leningrad, Izvestiya Vysshikh Uchebnykh Zavedeniy, Priborostroyeniye, Vol 5, No 5 1962, pp 75-80

The article describes a simple multiplying and dividing device incorporating four standard rotating transformers which does not require conventional amplifiers or processing motors. Such a device can multiply and divide directly ac voltages of identical frequency and phase. In this device the transformer stators are connected according to a bridge principle, while the double feed is applied to the transformers, i.e., simultaneous feeding from the stator and rotor side. The required rotation of the transformer rotor during balancing of the circuit is attanied by the moment arising in the transformer due to the double feed. The first two four-winding rotating transformers are connected in such a manner as to perform square root extraction. The power supply is drawn from a 400-cps source.

The suggested device was tested for 12 hours of continuous operation without excessive heating of the transformers. The experiment has shown that such a multiplying and dividing arrangement utilizing double feed for the rotating transformers can be successfully applied in automation systems and computing devices.

49. New Polish Computer Tested

"New Polish-Construction Electronic Brain"; Warsaw, Express Wieczorny, Vol 17, No 261, 3/4 Nov 62, p 5

The "Odra 1002", first Polish computer employing Polish-manufactured transistors, is being tested in the Computer Center of the Polish Academy of Sciences (Centrum Obliczeniowe Polskiej Akademii Nauk), and is showing satisfactory results, according to Prof Warmus, director of the center.

The "Odra 1002", constructed at the "ELWRO" works in Wroclaw, functioned for 24 hours without technical inspection, change of parts, or any damage.

[Note: The source carries a photograph of the "Odra 1002" control panel.]

50. Computer for Geological Research

"Rock-Determining Computer"; Budapest, Nepszeru Technika, Vol 11, No 10, Oct 62, p 310

The Geological Devices Institute of Leningrad has developed a new kind of instrument for determining substances uncovered in the course of geological research. It takes only 10 minutes to feed the primary data into the instrument. Then the Sz-2 computer begins operating and makes 1,906 multiplication and 91 additions in 10-15 minutes.

The device operates with a 2 percent margin of error. Its power source is a 2.4 volt battery.

[The article is accompanied by a clear photograph of the circular computer.]

Electrical Engineering

51. Utilization of High Mountain Water Power

"Problem of High Mountain Water Power," by V. Timoshenko, Chairman of the State Committee, Council of Ministers Kirgiz SSR for Coordination of Scientific-Research Work; Frunze, Sovetskaya Kirgiziya, 6 Oct 62, p 3

The Inter-Republic Conference on High Mountain Electric Transmission called by the State Committee, Council of Ministers Kirgiz SSR for Coordination of Scientific-Research Work, the Academy of Sciences Kirgiz SSR and the Republic Scientific and Technical Society for the Power Engineering Industry has been concluded at Frunze. Representatives from the Georgian, Armenian and Tadzhik SSR'S, as well as from Moscow and Leningrad were present.

It was disclosed at the conference that on the rivers Naryn and Vakhsh several high-water-head hydraulic stations could be built with a combined capacity up to 20 million kw. It was pointed out that at high altitudes the insulating properties of air deteriorate, thus increasing corona losses substantially. Power trnasmission lines are also subjected to unusually heave icing and strong winds at such high altitudes.

52. Design Trend of Free-Piston Engine--Gas Turbine Combination

"Fundamental Premises in Selection of Parameters for the Experimental Free-Piston Engine of the Central Scientific Research Institute, Ministry of Communications, and Future Trends of Research in This Field," by L. M. Mayzel' and B. M. Chernomordik; Moscow, Izvestiya Vysshikh Uchbnych Zavedeniy, Mashinostroyeniye, No 5, 1962, pp 5-17

The Central Scientific Research Institute of the Ministry of Communications believes that in addition to powerful electric and diesel locomotives Soviet railways could effectively utilize locomotives in which free-piston engines are combined with gas turbines.

For that purpose the institute is conducting a stand test of a 500-hp unit consisting of a combination of a free-piston engine with a gas turbine. Such power generating units have a very high power-to-weight ratio and are economical in fuel consumption.

Further increase in the effectiveness of such generating units can be secured by increasing the compressor pressure and by decreasing the "lost" motion of the pistons.

53. New 800,000-v DC Power Line from Volgograd to Donbass

"Electric Bridge from Bolga to Donbass," by V. Kostovshchikov; Moscow, Izvestiya, 30 Oct 62, p 4

The 800,000-v dc power line connecting Volgograd with the Donbass has just been completed. This power line will serve as a laboratory and as a prototype for future, still more powerful dc lines. Such dc power lines have important advantages over convential ac lines: high reliability and efficiency. The new power line has a very formidable appearance, each of its string insulators suspended from the towers weighs more than one ton. The builders of this line had to stretch power cables across the Don and Donets rivers.

The director of the "Volgogradelektroset'stroy" trust L. Bagdasaryan states:

"The new dc electric power line is now operating only at a voltage of 100,000 volts for the purpose of testing the equipment. The transmitting capacity of the line will increase gradually to its full designed capacity."

54. Neutralization of Stray Currents

"The Birth of Heat and Light," by P. G. Shengeliya; Tbilisi, Zarya Vostoka, 16 Sep 62, p 2

The article contains the following passages:

"Underground subway communication and electrified transport is developing fast in the large cities of our nation. In conjunction with this, the problem of stray ground currents becomes very acute. Such currents cause excessive corrosion to underground communication systems.

"Georgian scientists have succeeded in neutralizing electric corrosion, in improving the methods of design and adjustment of devices for protection of underground metal structures from electric corrosion. These improvements in corrosion protection are now widely used not only in our republic, but far beyond its boundaries."

55. Toktogul'skaya Hydroelectric Power Plant in Kirgiz SSR

"Reports on the Construction of Toktogul'skaya Hydroelectric Power Plant," by V. Nikulin; Moscow, Ekonomicheskaya Gazeta, 24 Nov 62, p 33

Although the construction of Toktogul'skaya bhdroelectric power plant on the Naryn river in Kirgiz SSR was not foreseen by the present Seven-Year Plan, the tremendous economic significance of this installation has made it necessary to start work on it now.

The water power resources of the Naryn river are no less than those of the Volga, and exceed the resources of such rivers and the Ob', Dnepr, Irtysh or Vakhsh. The 1,200,000-kw power plant will be build several kolometers from Toltogul. The engineering-economic indices of this power plant will be rather unique. Other hydroelectric power plants are planned for the Naryn river, which when completed will exceed in capacity the power plants on the Tennessee river.

Several hundred men are now engaged in the construction of the dam, aiming to complete the construction ahead of schedule. A huge division tunnel is now being driven through the high cliffs.

56. Effect of Excessive Utilization of Tidal Power on Earth's Rotation

"Treasury of the Earth's Power Resources," by Yu. Moralevich; Alma-Ata, Kazakhstanskaya Pravda, 16 Sep 62, p 4

The article contains the following passages:

"If the high tide of the sea could be entrapped by sepcial dams, it would serve as a powerful source of hydroelectric energy. There are quite a few Soviet and foreign projects for tidal electric-power stations. Such power generating installations have a decided advantage over wind and wea-wave power generating systems.

"At present the powerful reserve of low and high tide energy is utilized only to an insignificantly small extent, and yet it already has a retarding effect on the earth's rotation. However, with wider utilization of tidal power, the retarding effect on the earth's rotation would become quite noticeable.

"Let us imagine that all nations would begin to use tidal extensively power, thus making it the principal source of electric-power generation. The days will then begin to get longer at first by seconds, then by minutes and eventually by hours. A thirty-hour day! Such 30-hour days would become a horrible calamity for the earth. Torrid days would alternate with freezing nights.

"Most probably tidal power will be utilized only to an extend such as not to appreciably upset the duration of the day."

57. Transients in Variable-Speed DC Drives

"On Certain Questions of Investigating the Transient Processes in Electric DC Drives Where the Motor Speed is Regulated by the Flow of Excitation," by Zh. S. Gntuni; Yerevan, Sbornik Nauchnykh Trudov. Yerevanskiy Politekhnicheskiy Institut (Collection of Scientific Works. Yerevan Polytechnic Institute), 1960, pp 365-373 (from Referativnyy Zhurnal--Elektrotekhnika i Energetika, No 18, 1962, 18 K 9)

An analytical study was made of the transient processes that occur in electric DC drives where the motor speed is regulated by the variation of the flow of excitation. It is noted that the status of modern computer engineering permits a solution of a problem of this type. It is suggested that, in the computations, the complex integrand be replaced by a sum of comparatively simple functions. In such a replacement, the functions are limited to six terms of a polynomial in the majority of computations. Analytical expressions are obtained for the variation of current in the main circuit and the speed of the motor in relation to time and the system parameters of the electric drive, with the voltage drop in the rotor circuit taken into account.

It is shown that the transient processes in the cases considered here represent a time constant with respect to the excitation circuit and an electromechanical time constant with respect to the motor.

58. All-Electronic Commutating Synchronous Motors For Industrial Drives

"Contactless Synchronous Electric Motors For Driving Industrial Apparatus," by V. M. Kutsevalov; Trudy Instituta Energetiki AN LatvSSR, (Proceedings of the Institute of Power Engineering, Academy of Sciences Latvian SSR), Vol 12, 1961, pp 49-71 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 19, 15 Oct 62, 19 I 96)

A survey is given of the various modifications of electronically commutating (contactless) synchronous motors with fixed and rotating excitation coils and semiconductor rectifiers on the rotor. The simplest motor with fixed coils is one with external magnetic conductor and claw-shaped poles. The motor is started by eddy currents induced in solid (not laminated) poles; its starting torque amounts to 0.25-0.35 of the rated value. Thus this motor can be started with practically no load. Additional air gaps and the increased length of the external magnetic conductor leads to increase excitation.

The motor described here is 30 percent heavier than the ordinary synchronous motor.

Motors with rotating excitation coils and semidonductor rectifiers on the rotor have not come into general use because of the difficulty in protecting the rectifiers from spark-over during asynchronous starting.

59. Speed Control of AC Drives for Cranes

"Regulating the Speed of the Moving and Slewing Mechanisms of AC-Operated Cranes,: by A. G. Mekler, Z. Ye. Shafirov, and B. E. Eydel'man, Trudy Vsesoyuznogo Nauchmo-issledovatel'skogo Instituta Pod'yemno-transportnogo Mashinostroyeniya (Proceedings of the All-Union Scientific-Research Institute of Hoist and Transportation Machine-Building), No 1(12), 1961, pp 44-85 (from Referativnyy Zhurnal--Elektrotekhnika i Energetika, No 18, 1962, 18 K 46)

The overwelming majority of crane drives are AC motors because of their economy of operation. Attempts at improving induction motors for cranes, particularly with respect to speed and control, have met with sufficient success to indicate the feasibility of using this type of drive for cranes with any technological requirements. Here these requirements are enumerated, and results are given of a study of and a recommendation regarding the choice of control system and speed control for mechanisms which power and move cranes. Those systems considered were: stepwise control (called here speed control by varying the active resistance in the rotor circuit), speed control by varying the number of poles of the induction motor; discontinuous speed control through automatic interruption of the stator circuit or rotor circuit by a contactor controlled by the tachometer-generator; frequency speed control; and different variatorns of a throttle speed control.

For some of these methods, the authors di cuss certain theoretical considerations, methods of computing and certain experimental data.

The advantages of throttle speed control are emphasized.

60. Improving Commutating Conditions in DC Machines

"Pecularities of the Commutating Conditions of DC Machines With Compound Armature Windings," by V. G. Grigor'yev, Chief Engineer, Leningrad Branch, All-Union Scientific-Research Institute of Electromechanics (LFVNIIEM), Leningrad; Novocherkassk, Izvestiya VUZ, Elektromekhanika, No 9, 1962, pp 1083-1088

A description is given of oscillographic studies of the commutating conditions of generators of types GP-2200-/50 and GP-2000-750, GP 1600-750 and GPS-2000-1000, and MP-6800-340, conducted at the Electrical Machine Laboratory of LFVNIIEM, and at the testing shop of the Elektrosila Plant in Leningrad, and the following conclusions are drawn:

1. Voltage fluctuations between adjacent collector segments raise the maximum voltage values between them.

2. Compensating currents produced by unbalanced electromotive force and shorted by the brush contact impair commutating conditions, and also increase the value of the effective current in the parallel arm, thereby increasing losses and heating conditions.

3. Bifilar windings are extremely susceptible to surfact microdefects on the commutator, which can greatly impair the commutation conditions of the machine.

For improving the commutating conditions in view of these unfavorable conditions, a method is described which was devised by P. M. Impatov of the Electrical Machine Laboratory.

This article, which was based on a paper read at the Second All-Union Conference on the Commutation of Electrical Machines (held in Leningrad), was submitted for publication on 24 March 1962.

61. Equalizing Connections On One Side of Armature Improve DC-Machine Reliability

"Influence of the Higher Harmonics of the Magnetic Field On Voltage at the Segments For the Case of Bifilar Winding With Equalizing Connections On One Side of the Armature," by Z. Cherzohovskiy, Candidate of Technical Sciences, "Elektrotekhnika l' Plant, Prague; Novocherkassk, Izvestiya VUZ, Elektromekhanika, No 9, 1962, pp 1057-1066

These voltage distortions between the collector segments of DC machines are considered which are caused by the higher harmonics of the magnetic field of the stator, and which can cause sparking during no-load operation.

The discussion includes the modern status of the use of bifilar loop windings, forms of such windings, voltage asymmetry at the segments for the first harmonic, voltage between the sheets for the higher harmonics, methods for alleviating the unfavorable effect of the higher harmonics, and the influence of the balancing connections.

It is found that bifilar loop windings, in which the numbers $\frac{Q}{p}$; $\frac{K}{p}$ and u are odd numbers, have, in addition to the properties of the other parallel windings, the added advantage of secondary equalizing connections on one side of the armature, which means a saving in manufacturing material and greater reliability of operation.

62. Moscow-Leningrad (VNIIZht - LFVNIIEM) Dispute Over Commutation Theory

"On the Energy Theory of Commutation," by A. S. Kurbasov, Senior Scientific Associate, All-Union Scientific-Research Institute of Railroad Transport, (VNIIZhT) Moscow; Novocherkassk, Izvestiya VUZ, Elektormekhanika, No 9, 1962, pp 1076-1079; and "On the Article of A. S. Kurbasov, 'O. the Energy Theory of Commutation'", by O. G. Vegner, Senior Scientific Associate, Leningrad Branch, All-Union Scientific-Research Institute of Electromechanics, (LFVNIIEM) Leningrad, Ibid, pp 1080-1082

Kurbasov scores the opposition to the classical theory of commutation expressed in the books of M. F. Karasev (Kommutatsiya Mashin Postoyannogo Toka [Commutation of Direct-Current Machines], 1955) and, particularly, Vegner (Teoriya i Praktika Kommutatsii Mashin Postoyannogo Toka [Theory and Practice of Direct-Current Commutating Machines], 1961), claiming that the classical theory itself is correct, but that its interpretation has led to error. He attempts to show that the concept of rectilinear commutation, which is assumed to be the best way to transfer commutated energy from one section to another, has developed directly from the

classical theory, and that the energy theory of commutation has led to a number of new ideas on commutation. He discredits Vegner's limitation of communication to the release of current from the moving edge of the brush (weak-current step), which, he claims, amounts to commutation in the final phase only, rather than considering the conditions which considering conditions which determine the process of commutation as a whole, saying that Vegner has solved a problem which cannot be established or determined in practice.

Kurbasov's paper was presented at the Second All-Conference On the Commutation of Electrical Machines, held in Leningrad (probably sometime between 6 July 1959 (date of first conference) and December 1961 (earliest date papers submitted to this journal for publication).

In his rebuttal, Vegner claims that the fundamental error of the classical theory of commutation is its idealization of the properties of the sliding contact; he points out that Kurbasov not only limited his observations to abstract mathematical analysis, but even considered it possible to appraise the experimental results of other investigators on the basis of his limited analysis. He insists that any study of commutation must account for real conditions, otherwide the conclusions reached are trivial, no matter what method of investigation and what mathematical apparatus are used. He further points out that Kurbasov's attempt to use the equality of commutating and reactive electromotive forces, in the case of rectilinear commutation, as proof of the classical theory is erroneous, since this equality follows directly from the laws of electrodynamics for the conditions prevailing in the short circuiting section, because the algebraic sum of the transient voltage drops introduced into the commutation control is equal to zero.

Vegnar finally cites several special conditions which confront the investigator in any investigation under actual conditions, all of which Kurbasov has ignored in his paper.

63. Survey of Present Development and Problems of Commutation in DC Machines

"Modern DC Machines and the Problems of Commutation," by Isay Natanovich Rabinovich, Chief, Design Office, Elektrosila Plant; Novocherkassk, Izvestiya VUZ, Elektromekhanika, No 10, 1962, pp 1188-1194

This article is based on a paper read at the Second All-Union Conference On the Commutation of Electrical Machines (Leningrad 1960 to 1961) and discusses the modern requirements of dc machines, the commutation load of modern machines, practical measures to guarantee reliability of commutation, research in the field of commutation, and the determination of the quality of machine commutation.

It is mentioned that the All-Union Scientific-Research Institute Institute of Electromechanics has developed excellent apparatus for commutating research with respect to the study of commutator surface defects and other defects of the segments, but cuch machines have, unfortunately, not yet been introduced into industry in sufficinet numbers. The requirements for improvement of commutation equipment deal mostly with the production of better quality components and the improvement of technologies.

64. Problem of Brush War in Commutating Machines

"A Study of the Sliding Contact in a Trasformer-Oil Medium," by Nikokay Vasil'yevich Vlasenko, Candidate of Technical Sciences, Docent, Chair of Electrical Machines, L'vov Politechnic Institute, L'vov; Novocherkassk, Izvestiya VUZ, Elektromekhanika, No 10, 1962, pp 1195-1197

This item, based on a paper read at the Second All-Union Conference On the Commutation of Electrical Machines (Leningrad), reports on an experimental study of brush wear with a commutator immersed in transformer oil and operating at low voltage and ampere ratings and at low speed (1,200 rpm).

A final solution of the problem is considered to depend on a firmer establishment of the physical processes involved in the operation of sliding contacts.

65. Effect of Beta-Emission on Characteristics of Lead-Acid Batteries

"The Effect of Beta-Emitting Radioactive Isotope S^{35} on the Characteristic of RG-Type Lead-Acid Batteries," by V. Ye. Nanoylov and G. Pl Tolmachev, Izvestiya Leningradskogo Elektrotekhnicheskogo Instituta, No 46, 1961, pp 319-327 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 19, 15 Oct 62, 19 A 83)

The increased capacitance of NKN-10 alkaline batteries following the introductions 15-20 microguries of Ca^{45} into the electrolyte is assumed to be this result of radiation effects. In such a case, during the migration of the ionized particles through the liquid, the number of radiolyzed water molecules amounts to 10-12 per each 100 electrol volts of absorbed radiation energy.

It is assumed that the introduction of S^{35}, with a maximum radiation energy of E β= 67 Mev, into the electrolyte affords the possibility of obtaining 1.1-1.7 radiolyzed water particles per second per decay. A brief 3-4 percent increase of capacitance of type RC electrolyte with the introduction of 60-30 microcuries of S^{35} was confirmed experimentally, whereas the remaining characteristics of the battery were impaired.

66. Amount of Heat Exchanged by Convection in Gas Combustion Chambers

"The Influence of convective Heat Exchange On the Process of Heat Transfer in Combustion Chambers," by B. P. Ignatov, Trudy Kuybyshevskogo Aviatsionnogo Instituta (Proceedings of the Kuybyshev Aviation Institute), No 12, 1961, pp 173-183 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 12, 30 Jun 62, 12 G 5)

Results are given of an experimental determination of the amount of heat transferred by convection for various methods of burning gas in the combustion chambers of steam boilers. Empirical formulas are obtained for the determination of the heat exchange by convection in combustion chambers which employ a flameless combustion of a gas.

It was found that the portion of heat exchanged by convection in the flameless combustion of highly claorific gases amounts to 25-27 percent.

67. Heat Exchange and Mass Transfer in Combined Forced and Free Convection Effect

"Cirterion Equations of Heat Exchange and Heat and Mass Exchange During the Simultaneous Action of Forced and Free Convection (The External Problem)," by L. S. Klyachko, Sbornik Trudov.Vsesoyuznyy Nauchno-issledovatel'nyy Institut Gidrotekhnicheskykh i Sanitarnotekhnicheskykh Rabot (Collected Works. The All-Union Scientific-Research Institute of Hydraulic Engineering and Sanitary Engineering Works), No 15, 1960, pp 65-72 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 12, 30 Jun 62, 12 G 1.)

In view of the inaccurach of recording the results of an experiment in the form $Nu_k = cRe^nAr^mPr^q$ in the case of the heat transfer resulting from the joint action of free and forced convection, this work attemps to present the result of such experiments in a more general form in order to obtain relationships which are applicable to extrapolation for other forms of material transfer occuring in hydromechanical equipment which is analogous or similar in principle. Possible ways of solving the problem are considered.

Relationships are obtained for the laminar and turbulent regimes of heat exchange in which the complexes Ar/Re^2 and Re^2/Ar occur. Numberical values of a constant are obtained for cases of practical importance on the basis of known experimental data.

These establishment of limits of application of the obtained equations is discussed.

68. Deflection and Separation in Dust-Laden Flow Around a Cylinder

"Dust-Laden Flow Around an Immobile Cylinder," by A. P. Chernov, Trudy Instituta Energetiki AN KazSSR (Proceedings of the Institute of Power Engineering, Academy of Sciences Kazakh SSR), No 3, 1961, pp 201-211 (from Referativnyy Zhurnal -- Elektrotekhnika i Engergetika, No 18, 1962, 18 G 5)

A method is given of computing the trajectories and coefficient of spearation of dust particles in a flow around a cylinder. The results are given in graphic form, and a circuit diagram and description are given of the experimental apparatus used to study the trajectories. The dust particles used were of rosin, boric acid, river sand and chromomagnesite with specific weights of 0.95, 1.4, 2.7, and 3.9 grams per cubic centimeter, respectively.

In the total of 20 tests conducted, the particles were photographed, and the photographs were analyzed for the following: velocity of the particles, the initial deviation from a rectilinear direction of flight, the maximum deviation and the coefficient of separation.

It was found that the maximum deflection of the particles from the cylinder and the coefficient of separation depend on several parameters: particle dimensions, particle density, velocity of flow and the diameter of the cylinder. In general, the maximum deflection of the particles and the coefficient and the coefficient of separation are determined completely by one Stokes criterion.

The experimental results were in good agreement with theory.

69. Lightweight Latvian Battery Charger Uses VG-10 Germanium Rectifiers

"Portable Charger With Germanium Rectifiers," by L. A. Rutmanis, Trudy Instituta Energetiki i Elektrotekhniki AN LatvSSR (Proceedings of the Institute of Power Engineering and Electrical Engineering, Academy of Sciences Latvian SSR), Vol 11, 1961 pp 123-128 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 12, 30 Jun 62, 12 A 44)

The AZD-4/30 motor generator charger, which weighs about 460 kilograms and has a 4-kilowatt output, has been replaced by the ZUG-1 charger which weighs only 90 kilograms, has an output power of 4.2 kilowatts, is fed by three-phase mains connection with 380-220 volts and sustained current of 70 amperes, has output voltage regulation in steps of 3 volts in the rang of 60-77 volts and an efficiency of 94-95 percent. It uses six VG-10 germanium rectifiers.

70. Accurate Determination of Processes in Three-Phase Bridge Circuit

"Three-Phase Bridge Circuit (Basic Equations and External Characteristic)," by V. I. Yemel'yanov, Izvestiya Nauchno-issledovatel'skogo Instituta Postoyannogo Toka (Reports of the Scientific-Research Institute of Direc Current), Collection 8, 1961, pp 171-211 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 19, 15 Oct 62, 19 L 40)

On the assumption that most studies of the electromagnetic processes in a three-phase bridge circuit usually determine the rectifier properties under the simplest conditions of operation or where mathematical treatment is easiest (rectified current does not vary) thereby arriving at an insufficient solution, on the basis of which it is not possible to appraise the effect of any parameter on the accuracy of the solution, this work presents the basic equations of such a circuit operating in a discontinuous current regime, under general operating conditions, and in a regime close to deadload operation. The external characteristics of the circuit are determined on the basis of these equations.

The mathematical treatment and the theoretical considerations developed here afford the possibility of the following conclusions of importance to practice.

Where, as in the majority of cases, the relationships $\xi = \frac{X}{x} > 5$ (where X and x are the inductive impedances in the DC and AC circuits, respectively) applies, the simple relationships found for $\xi = \infty$ can almost always be used. The error involved in this approach is negligible.

The formulas, graphs and tables given here afford the possibility of obtaining a more accurate solution and of estimating the error.

71. 12-Phase Rectifier Circuit With Series-Connected Transformer Primaries

"Twelve-Phase Bridge Rectifier WithSeries Connected Primary Transformer Coils," by G. V. Ivenskiy, A. V. Posse, and M. A. Slonim, Izvestiya Nauchno-isseldovatel'skogo Instituta Postoyannogo Toka (Reports of the Scientific-Research Institute of Direct Current), Collection 8, 1961, pp 83-110 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 9, 15 Oct 62, 19 L 39)

Results are given of an analysis and an experimental study of a 12-phase rectifier circuit with series-connected primary coils in the two transformers and parallel-connected rectifier bridges in steady-state

regimes from no-load to full-load operation. The necessary equations for computing the circuit are obtained, and the main characteristics and properties of the rectifier are established. The experimental portion of the work is devoted to the confirmation of the theoretical conclusions regarding operation in steady-state regimes; the mechanism of the transient process during backfiring is explained.

A comparison of 12-phase rectifiers with series-connected and parallel-connected transformer feeds shows that the series-connection produces a much higher power factor under equal conditions, but no appreciable change of other characteristics.

The main advantage of the 12-phase circuit with series transformer feed is the good limitation of backfiring current, the maximum value of which, in the initial period, does not exceed 2.5 times the value of the rectifier current before backfire. It is assumed that this advantage opens the way for the 12-phase rectifier circuit for use in power rectifier installations with mercury and semiconductor rectifiers.

III. CONFERENCES

72. Recent Soviet Conferences in Electronics and Engineering

The conferences listed below were reported or announced in recent issues of Soviet periodicals. Included in the listing are the date and location of the conference, sponsoring organization, and source. Unless otherwise indicated, it is assumed that there was no non-Soviet participation in the conferences.

a. Second All-Union Conference on the Theory of Invariance and its Application in Automatic Systems; 29 May-1 June 1962, Kiev; sponsored by the Department of Technical Sciences of the Academy of Sciences USSR (Institute of Automatics and Telemechanics), the Department of Technical Sciences of the Academy of Sciences Ukrainian SSR (Institute of Electrical Engineering), the Kiev Higher Engineering Aviation Institute, the Kiev Higher Engineering Radio Engineering Institute, and the Kiev Institute of the Civil Air Fleet; third conference to be held in 1965. (Avtomatyka, No 5, 1962, p 70)

b. International Scientific Conference on Automation of Experimental Data Processing; October 1962, Dubna; sponsored by the Council on Radio Electronics of the Joint Institute of Nuclear Research; representatives from Bulgaria, Hungary, GDR, China, Korea, Poland, Rumania, and Czechoslovakia. (Leninskoye Znamya, 30 Oct 62, p 3)

c. Second Scientific-Technical Conference on Cybernetics Means of Improving Measuring Apparatus; 26-29 June 1962, Leningrad. (Priborostroveniye, NO 10, Oct 62, p 30)

d. Conference on the Use of Computer Engineering Methods for the Automation of Production Processes; June 1962; sponsored by the State Committee of the Council of Ministers USSR on Automation and Machine Building, the State Committee of the Council of Ministers RSFSR for Coordingation of Scientific Research Work, and the Scientific-Technical Society of the Instrument Building Societ . (Mekhanizatsiya i Avtomatizatsiya Proizvodstva, No 9, Sep 62, p 56)

e. First Intervuz Scientific-Technical Conference on Microminiaturization of Radio Electronic Equipment; March 1962, Taganrog; sponsored by the Ministry of Higher and Secondary Special Education USSR and RSFSR, and the Scientific-Technical Society of Radio Engineering and Electrical Communications imeni A. S. Popov; next conference to be held in 1963. (Izvestiya Vysshikh Uchebnykh Zavedeniy -- Radiotekhnika, No 4, Jul/Aug 62, p 538)

f. Scientific Conference on the Use of Electronic Computers in the National Economy; 2nd half of April 1962, Gor'kiy; sponsored by the scientific research institutes of the Gor'kiy Sovnarkhoz. (Turkmenskaya Iskra, 14 Nov 62, p 2)

g. All-Union Conference on the Recording of Electrical Energy and the Repair, Testing, and Exploitation of Wattmeters; 15-17 November 1962, Riga. (Sovetskaya Latviya, 15 Nov 62, p 4)

h. All-Union Conference on the Scientific Investigation, Construction Design, and Exploitation of Power-Irrigation Complexes and Electromechanical Irrigation; 25-28 October 1962, Dushanbe. (Kommunist Tadzhikistana, 31 Oct 62, p 3)

i. Scientific-Technical Conference on Problems of Mechanical Fatigue of Metals; May 1962, Moscow; sponsored by the Scientific Council on the Problem "Principles of Strength and Plasticity" under the Department of Technical Sciences of the Academy of Sciences USSR, the Central Board of the Scientific-Technical Society of the Machine Building Industry, and the Institute of Machine Studies of the State Committee on Automation and Machine Building. (Vestnik Mashinostroyeniya, No 8, Aug 62, p 81)

j. Second All-Union Symposium of Glaciologists (on problems of fluctuations in the regime of existing glaciers); Jun Jul 1962, Alma-Ata. (Vestnik Akademii Nauk Kazakhskoy SSR, No 10, Oct 62, p 86; and Priroda, No 10, Oct 62, p 112)

73. Third Conference on Invariance in Automatic Systems in 1965

"Second All-Union Conference on the Theory of Invariance and its Application in Atuomatic Systems," by S. F. Kozubovs'kiy and Yu. V. Krementulo; Kiev, Avtomatyka, No 5, 1962, pp 70-73

The Second All-Union Conference on the Theory of Invariance and its Application in Automatic Systems was held in Kiev on 29 May-1 June 1962. The conference was organized by the Institute of Automatics and Telemechanics of the Department of Technical Sciences of the Academy of Sciences USSR and the Institute of Electrical Engineering of the Department of Technical Sciences of the Academy of Sciences Ukrainian SSR, with the assistance of the Kiev Higher Engineering Aviation School, the Kiev Higher Engineering Radio Engineering School, and the Kiev Institute of the Civil Air Fleet.

Participants of the conference resolved to call the Third All-Union Conference on the Theory of Invariance and its Application in Automatic Systems in 1965.

Non-Soviet representation at the conference is not indicated in the article.

74. Second Conference on Microminiaturization in 1963

"First Intervuz Scientific-Technical Conference on Microminiaturization of Radio Electronic Equipment," by R. S. Kil'metov, A. V. Kovalev, and Ye. B. Mekhantsev; Kiev, Izvestiya Vysshikh Uchebnykh Zavedeniy -- Radiotekhnika, No 4, Jul/Aug 62, pp 538-539

The First Intervuz Scientific-Technical Conference on Microminiaturization of Radio Electronic Equipment, sponsored by the Ministries of Higher and Secondary Special Education USSR and RSFSR and the Scientific-Technical Society of Radio Engineering and Electrical Communications imeni A. S. Popov, was held in March 1962 at the Taganrog Radio Engineering Institute. A resolution was adopted to call the Second Intervuz Conference on this problem in 1963.

75. Polish Conference on Transmission of Machine-Processed Data

"Polish Conference on Transmission of Machine-Processed Information;" Prague, Ceskoslovenske Spoje, No 10, Oct 62,

The First Polish Conference on Transmission Machine-Processed Data by Teletype and Telephone was held in Warsaw (date not indicated). It was based on the recommendations of the International Telegraph Consltative Committee (CCITT) adopted in Geneva in 1961.

Addresses presneted at the conference dealt with progress on and preparations for adaptation of Polish communications networks for transmission of data from automatic computers. Work along this line is being carried on at the Research Institute for Communications, advanced schools, and enterprises producing telephonic equipment.

A Czechoslovak delegation also attended the conference.

Materials presented at the conference are now in the process of translation and are as follows: "Studying Possibilities for Utilization of Telephonic Communications for Transmission on Data,"

by Engr Alfred Popowicz, Translation No 0149812/22887; "Measuring Equipment for Analysis of Brief Interruptions of Transmission and Changes in Quality," by Engr ZenonBaran, Translation No 015127/23108; and "Some Practical Utilization of Transmission of Data in Centralized Systems," Translation No 0149813/22888.

These translations may be ordered from the Institute for Technical and Economic Information, Trida Politickych Veznu 11, Prague 1.

* * *

7 September 2004

Ms. Roberta Schoen
Deputy Director for Operations
Defense Technical Information Center
7725 John J. Kingman Road
Suite 0944
Ft. Belvoir, VA 22060

Dear Ms. Schoen:

In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

We have completed a declassification review of the "Non-NIS" referral list and include the results of that review as Enclosure 1. Of the 220 documents identified in our declassification database, only three are classified. These three are in the Release in Part category and may be released to the public once specified portions of the documents are removed. Sanitization instructions for these documents are included with Enclosure 1.

In addition to the documents addressed in Enclosure 1, 14 other documents were unable to be identified. DTIC then provided the CDC with hard copies of these documents in April 2004 for declassification review. The results of this review are provided as Enclosure 2.

We at CIA greatly appreciate your cooperation in this matter. Should you have any questions concerning this letter and for coordination of any further developments, please contact Donald Black of this office at (703) 613-1415.

Sincerely,

Nancy Jo Sanders for

Sergio N. Alcivar
Chief, CIA Declassification Center,
Declassification Review and Referral
Branch

Enclosures:

1. Declassification Review of CIA Documents at DTIC (with sanitization instructions for 3 documents)
2. Declassification Status of CIA Documents (hard copy) Referred by DTIC (with review processing sheets for each document)

Processing of OGA-Held CIA Documents

The following CIA documents located at DTIC were reviewed by CIA and declassification guidance has been provided.

OGA Doc ID	Job Num	Box	Fldr	Doc	Doc ID	Document Title	Pub Date	Pages	Decision	Proc Date
AD0343932	78-03117A	213	1	18	5117	Scientific Information Report Chinese Science (34)	10/22/1963	89	Approved For Release	3/29/2004
AD0344702	78-03117A	214	1	21	5149	Scientific Information Report Chinese Science (35)	11/4/1963	133	Approved For Release	3/29/2004
AD0344965	78-03117A	215	1	4	5163	Scientific Information Report Chinese Science (36)	11/7/1963	133	Approved For Release	3/29/2004
AD0345229	78-03117A	215	1	23	5182	Scientific Information Report Chinese Science (37)	11/18/1963	179	Approved For Release	3/29/2004
AD0345750	78-03117A	216	1	20	5209	Scientific Information Report Chinese Science (38)	12/11/1963	174	Approved For Release	3/29/2004
AD0344419	78-03117A	217	1	20	5241	Scientific Information Report Chinese Science (39)	12/27/1963	75	Approved For Release	3/29/2004
AD0346493	78-03117A	218	1	21	5277	Scientific Information Report Chinese Science (40)	1/10/1964	115	Approved For Release	3/29/2004
AD0346725	78-03117A	219	1	27	5320	Scientific Information Report Chinese Science (41)	1/27/1964	78	Approved For Release	3/29/2004
AD0347051	78-03117A	220	1	25	5359	Scientific Information Report Chinese Science (42)	2/6/1964	78	Approved For Release	3/29/2004
AD0347849	78-03117A	221	1	39	5407	Scientific Information Report Chinese Science (43)	3/2/1964	174	Approved For Release	3/29/2004
AD0347929	78-03117A	222	1	25	5438	Scientific Information Report Chinese Science (44)	3/5/1964	104	Approved For Release	3/29/2004
AD0348352	78-03117A	223	1	20	5479	Scientific Information Report Chinese Science (45)	3/20/1964	117	Approved For Release	3/29/2004
AD0349491	78-03117A	225	1	18	5560	Scientific Information Report Chinese Science (46)	4/24/1964	118	Approved For Release	3/29/2004
AD0349657	78-03117A	225	1	34	5581	Scientific Information Report Chinese Science (47)	5/4/1964	98	Approved For Release	3/29/2004
AD0332751	78-03117A	183	1	29	3940	Scientific Information Report Electronics And Engineering (22)	10/19/1962	68	Approved For Release	3/29/2004
AD0333146	78-03117A	186	1	20	4041	Scientific Information Report Electronics And Engineering (23)	11/23/1962	73	Approved For Release	3/29/2004
AD0334103	78-03117A	188	1	37	4136	Scientific Information Report Electronics And Engineering (24)	12/20/1962	62	Approved For Release	3/29/2004
AD0334236	78-03117A	190	1	40	4217	Scientific Information Report Electronics And Engineering (25)	1/22/1963	48	Approved For Release	3/29/2004
AD0334769	78-03117A	193	1	39	4339	Scientific Information Report Electronics And Engineering (26)	2/28/1963	68	Approved For Release	3/29/2004
AD0335480	78-03117A	196	1	17	4436	Scientific Information Report Electronics And Engineering (27)	3/21/1963	95	Approved For Release	3/29/2004
AD0336306	78-03117A	199	1	2	4538	Scientific Information Report Electronics And Engineering (28)	4/25/1963	69	Approved For Release	3/29/2004
AD0332433	78-03117A	183	1	35	3946	Scientific Information Report Organization And Administration Of Soviet Science (5)	10/22/1962	60	Approved For Release	3/29/2004